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ROYAL COMMISSION OF INQUIRY INTO CERTAIN
DEATHS AT THE HOSPITAL FOR SICK CHILDREN AND
RELATED MATTERS.

Hearing held
8th floor

180 Dundas Street West
Toronto, Ontario

HASTREITER
(Cont'd)

The Honourable Mr. Justice S.G.M. Grange

Commissioner

P.S.A. Lamak, Q.C.

Counsel

E.A. Cronk

Associate Counsel

Thomas Millar

Administrator

In Ch.

Transcript of evidence
for

December 6, 1983

VOLUME 76

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ROYAL COMMISSION OF INQUIRY INTO CERTAIN
DEATHS AT THE HOSPITAL FOR SICK CHILDREN
AND RELATED MATTERS.

Hearing held on the 8th Floor,
180 Dundas Street West, Toronto,
Ontario, on Tuesday, the 6th day
of December, 1983.

THE HONOURABLE MR. JUSTICE S.G.M. GRANGE - Commissioner
THOMAS MILLAR - Administrator
MURRAY R. ELLIOT - Registrar


APPEARANCES:

P.S.A. LAMEK, Q.C.)	Commission Counsel
E. CRONK)	
D. HUNT)	Counsel for the Attorney
L. CECCHETTO)	General and Solicitor General
	of Ontario (Crown Attorneys
	and Coroner's Office)
I.G. SCOTT, Q.C.)	Counsel for The Hospital for
M. THOMSON)	Sick Children
R. BATTY)	
D. YOUNG	Counsel for The Metropolitan
	Toronto Police
W.N. ORTVED	Counsel for numerous Doctors
	at The Hospital for Sick
	Children
B. SYMES	Counsel for the Registered
	Nurses' Association of Ontario
	and 35 Registered Nurses at
	The Hospital for Sick Children



APPEARANCES: (Continued)

D. BROWN	Counsel for Susan Nelles - Nurse
E. FORSTER	Counsel for Phyllis Trayner - Nurse
J.A. OLAH	Counsel for Janet Brownless - R.N.A.
B. JACKMAN	Counsel for Mrs. M. Christie - R.N.A.
S. LABOW	Counsel for Mr. & Mrs. Gosselin, Mr. & Mrs. Gionas, Mr. & Mrs. Inwood, Mr. & Mrs. Turner, Mr. & Mrs. Lutes, and Mr. & Mrs. Murphy (parents of deceased children)
F.J. SHANAHAN	Counsel for Mr. & Mrs. Dominic Lombardo (parents of deceased child Stephanie Lombardo); and Heather Dawson (mother of deceased child Amber Dawson)
W.W. TOBIAS	Counsel for Mr. & Mrs. Hines (parents of deceased child Jordan Hines)
J. SHINEHOFT	Counsel for Lorie Pacsai and Kevin Garnet (parents of deceased child Kevin Pacsai)



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NAME

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HASTREITER, (Dr.) Alois Rudolf; Resumed

6615

Direct Examination by Mr. Lamek (Cont'd)

6615



BmB.jc
A

1
2 --- Upon commencing at 10:00 a.m.

3 DR. ALOIS RUDOLF HASTREITER, Resumed

4 DIRECT EXAMINATION BY MR. LAMEK (CONTINUED):

5 THE COMMISSIONER: Mr. Lamek?

6 MR. LAMEK: Sir.

7 Q Dr. Hastreiter, when we broke
8 at the end of the day yesterday we had just gone
9 through the exercise that you had gone through in
10 coming to a conclusion as to the probable route of
11 administration and time of administration of the
12 dose of digoxin which in your view was administered
13 to Justin Cook and we were just about to come to your
14 opinion as to the size of the dose that was
15 administered to the child.

16 Let me ask you first: why were you
17 interested in knowing how much digoxin was administered?

18 A I was always very hesitant in
19 trying to calculate dosages because it is a very
20 difficult thing to do. However, as I was specifically
21 asked to do it and I believe it is important to have
22 an idea of the size of the dose, especially in order
23 to try to predict how it was given whether it could
24 have been given accidentally or not or whether it
25 could have been given by different routes, you know,
by mouth or intravenously.



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Q Is it in your view, Doctor,
fair to say that if the results, that is to say, the
death and the recorded concentrations, could have
been achieved by the administration of less than one
vial, even an adult vial of the drug, then the
possibility of accidental administration has to be
considered as a general proposition?

A I believe so, as a general
proposition. Of course, accidents don't happen
repeatedly and there are several factors that must
be taken into consideration.

Q Is it also fair to formulate
the converse of the proposition, Dr. Hastreiter, in
your view that, and we have had this opinion expressed
here I should tell you, that accidental administration
becomes less likely if more than one ampule of the
drug has to be administered in order to achieve the
recorded results of death and concentrations. Do
you agree with that?

A Yes, I believe that is true.

Q Now, at page 10 of the binder,
Dr. Hastreiter, your letter of May 29th, 1981.

A No, I don't have my binder.

Q You don't have the binder with
you, that is unfortunate.



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A. I forgot to bring it with me.

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MR. LAMEK: I can help you.

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THE COMMISSIONER: It is Exhibit 264.

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We have found another copy if that helps, does it?

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MR. LAMEK: No, it is all right,

7

thank you, sir. Dr. Hastreiter has Miss Feinberg's
and she has gone down to retrieve his.

8

9

Q. At page 10 in your covering
letter, May 29, 1981 to Mr. Wiley, in the second
paragraph beginning at the second sentence, you
state your provisos and reservations and you say:

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12

The calculations of the digoxin
dose are rough estimates and subject
to considerable errors. I believe,
however, that this is as close as
one can get to the truth with the
available information. It should be
noted that, because of the age range
of the 4 babies involved, the so-
called 'volume of distribution' of
16 litres per kilogram used may be
excessive, particularly for the
younger infant, and a figure of 10
litres per kilogram might be more
accurate for these infants. This

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"means that the calculated figures
for the dose of digoxin administered
have to be reduced by about 1/3."

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So, with that caveat and warning as
to the, if you like, margin of error that is involved
in any such calculation or estimation can we turn to
page 25 which indeed contains the calculations that
you did to estimate the dose administered to Cook,
Miller and Pacsai, the next page, to Estrella. Now,
Dr. Hastreiter, I don't propose to go through these
calculations in detail for each of the children
for whom you did one but I think it may be worthwhile
doing the exercise once.

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With respect to Cook you calculate
that a dose of 6 milligrams, 6.01 milligrams of
digoxin was administered?

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A. Yes.

Q Now, a little less than a year
later in April of 1982 you gave evidence at the
preliminary inquiry into the charges against Nurse
Nelles and in Volume 33 at page 53 the following
exchange took place between yourself and counsel
for the Crown, Mr. Magee. Beginning at line 7, Mr.
Commissioner:

"Q Now, the digoxin overdose,



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"Mr. Cimbura's tests revealed that the blood that was taken post mortem had a reading of something like 91 nanograms per millilitre of digoxin in it. Are you able to equate that or what dosage of digoxin, whether oral or intravenous or otherwise would be required to produce that amount of digoxin in the baby's system in the blood?

"A. Mr. Cimbura yesterday, I calculated the amount he used for his calculation, the blood analysis he had performed himself, which was a post mortem blood sample, and since post mortem blood samples are on the average about twice the concentration of the ante mortem sample, the pre mortem sample, he divided it by 2. The concentration in his calculation was something like 2.37, between 2 and 2-1/2 milligrams. If I used the same samples that he did I would arrive at the same results. However, if I



A.6

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2 "used the blood sample that was
3 obtained pre mortem we have such a
4 sample where the concentration was
5 72 nanograms per millilitre.

6 "Q. That was blood drawn after or
7 during the arrest procedures?

8 "A. During the arrest. This should
9 be a true reflection of what the level
10 was at the time of death, then I
11 would arrive at a little higher
12 value which would be around 4 milli-
grams."

13 Obviously, Doctor, my first question
14 has to be, why in the space of something less than
15 a year had your calculation of the dose declined
from 6 milligrams to 4 milligrams?

16 A. Well, in the first place I
17 think that this should be actually considered a very
18 small change because the error involved in this type
19 of calculation I think is enormous. I think you
20 could have a fourfold type error, and this has been
21 calculated by others. The reason for the difference
22 here is simply because the volume of distribution
23 was calculated here as being 16 litres the first time
and the second time was 10 litres.

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Q. I see, okay.

A. So, that will make it two-thirds of the original dose.

Q. It reflects the reduction in the volume of distribution that you had suggested in your covering letter to Mr. Wiley on May 29th?

A. Exactly.

Q. Okay. And then subsequently in your evidence at the preliminary, page 54, the bottom of the page you were asked to translate the dosage that you had calculated in terms of volumes of digoxin preparations and you said:

"To obtain the pre mortem level of 72, according to my calculation, you would take 4 milligrams, which would be 80 cc's of the elixir, the bottle contains 100 cc's or 100 millilitres, if you like, so it would be 80 millilitres or four-fifths of one bottle, approximately."

And then at the bottom of page 55 you said:

"The amount corresponding to 4 milligrams, since we have .5 milligrams per ampule of the adult dosage would



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"be 8 ampules, 8 ampules of the
adult preparation."

And then at the bottom of page 56 and
the top of page 57 you said that 4 milligrams would
translate to approximately 80 ampules of the
paediatric preparation. You gave a range of 40 to
160. But if you were positing 8 of the adult, I take
it, that would be 80 of the Canadian paediatric
preparation?

A. Right.

Q. Yes. In either case, Doctor,
whether you are looking at 4 milligrams or 6 milligrams
as the dose, you are talking truly a massive dose of
digoxin, are you not?

A. Right.

Q. And believe me I don't intend to
be offensive but isn't the calculated dose, even at
4 milligrams, so huge as to be incredible?

A. Yes, I would think so. Perhaps
I should explain later that there is a range and I
am sure you have heard evidence here to the fact that
smaller doses cannot be calculated assuming the time
distribution factor and what I calculated here was
essentially one of steady state, complete equilibrium,
which would be the highest possible level. I



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hesitated to calculate any volumes during the
distribution, any values during the distribution
phase because it was so uncertain. We had no idea
about time, plus the fact that the volume of
distributions vary so much and there was relatively
little information available, especially at that
time, then additional information became available
a year or two later which made it very difficult
really to perform I think an adequate calculation.

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2 However, if one does take the fact
3 into consideration; if one would like to establish a
4 range from a minimum to a maximum, I think that is
5 possible taking, let's say, the volume of distribution
6 of 1 instead of 10, that would be the volume of the
7 central compartment. And then your dosage would be
8 ten times less, therefore instead of 4 mg. really
9 the minimum would be around 0.4, possibly 0.5, and
10 this would be the range you would be working in.

11 Q. Can we come back to that in
12 a moment then, doctor. Because that may be a much
13 more significant number for this Commission to be
14 grappling with I think you would agree. But if I
15 understand you correctly, in doing the calculations
16 that you did, which are set out on page 25-26 of the
17 binder here, you treated the established concentrations,
18 and I assume that where they were post mortem con-
19 centrations you made an adjustment to estimate an
20 ante mortem concentration. You treated those
21 concentrations as though they represented steady
22 state of distribution?

23 A. Yes.

24 Q. And applied to them and plugged
25 into the calculation a volume of distribution ap-
propriate to steady state distribution?



1
B2 2 A. Right.
3 Q. But you are not, in producing
4 the dosages that you have calculated, whether in the
5 case of Cook, the dosage, whether it be 4 mg. or 6 mg.
6 I take it you are not seriously suggesting that
7 somebody drew up into a large syringe 8 adult ampoules
8 of digoxin, smuggled the syringe into the baby's room
9 and administered that amount of volume of the prepara-
10 tion to the child, that is not really what you are
11 suggesting here, is it?
12 A. Well, this would be very
13 impractical, but you know this would be sort of an
14 upper limits situation.
15 Q. You are not suggesting that is
16 the likely scenario?
17 A. No.
18 Q. How long would it take to
19 administer such a dose to a child?
20 A. Intravenously?
21 Q. Yes.
22 A. It would take at least ten
23 minutes probably.
24 Q. I would suggest it would be
25 reasonable to think that if someone were observed
doing that it might just excite the curiosity of the



B3

onlooker.

A. Yes, because you are dealing with a small vein and you don't want to produce problems. When you are infusing you have to inject slowly and that would take time. Although if one were to use the adult solution of 8 cc. it could be injected actually in a shorter period of time, you know, perhaps five minutes.

Q. You are still talking 8 vials there, are you not?

A. 16 cc., 8 vials of 2 cc. each.

Q. Yes.

A. Yes.

Q. To deliver 4 mg. of digoxin?

A. Yes.

Q. I take it it would be even less practical for someone to slide into the room with 8 vials in his or her pocket and draw them up one by one in the room and administer them?

A. That would be very impractical, yes.

Q. Indeed, doctor, if you agree, as I think you have said, that the administration of more than one ampoule makes accident unlikely. Is it not fair to say that the administration of 8 ampoules



Hastreiter
dr.ex. (Lamek)

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B4 2 makes deliberate administration equally unlikely, if
3 that is really what we have to be talking about, it is
4 not a practical proposition, is it?

5 A. It is not practical.

6 Q. I confess there is one other
7 thing about the assumption of steady state distribution
8 that bothers me; and that is, as I understand it,
9 steady state is essentially achieved after 5 half
lives of distribution?

10 A. Right.

11 Q. Approximately two and a half
12 hours after administration?

13 A. At least.

14 Q. And therefore for the levels
15 recorded to represent steady state distribution, that
16 would be at variance with what you have already
17 given as your opinion as to the probable time of
administration here, would it not?

18 A. It would be, it would be a little
19 shorter, yes.

20 Q. I rather understood yesterday
21 that you were suggesting that administration of the
22 drug may have occurred in the case of Justin Cook
between about 3:15 and 3:40, somewhere in that area?

23 A. Right.

24

25





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B5 2 Q. We know that the sample was
3 drawn at 4:30.
4 A. So it was an hour.
5 Q. An hour later.
6 A. Right.
7 Q. And in that hour steady state
8 would not be achieved in any event, would it?
9 A. No.
10 Q. But I understand that you used
11 that assumption of steady state, because that at
12 least removes some of the areas of speculation as to
13 just how far along the alpha phase of distribution it
14 was appropriate to select your volume of distribution?
15 A. Yes, and also because we had
16 better knowledge of a steady state situation, for
17 little babies, you know, because for instance the
18 volume of central compartment there was very little
19 information available that was solid I thought at the
20 time, and without a good basis it is very hard to
21 make any calculations.
22 Q. I confess, doctor, that I am
23 still a little puzzled as to why in your report you
24 would produce calculations, and why at the preliminary
25 hearing you would give evidence based upon an assumption which was inconsistent with your stated opinion



B6

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2 as to the likely time of administration without
3 clearly flagging that's what you were doing.

4 A. Well I think both our
5 assumptions really, and you know we will probably
6 have to try and conciliate the two as best we can,
7 as well as we can. But the time could be off by an
8 hour and the levels, the dosage could be off by half
9 or, you know, there could be a fourfold variation
10 possibly in the calculations. So I think there are
11 many, many factors which could produce errors.

12 Q. I am not suggesting for a
13 moment this is an exact science, believe me.

14 A. No, no.

15 Q. But the key to it is your use
16 of a volume of distribution appropriate to steady
17 state distribution. Initially in your report 16 litres
18 per kilogram, and subsequently for the purposes of
19 giving evidence at the preliminary inquiry of 10 litres
20 per kilogram.

21 A. I could perhaps say this.
22 Let's say that we were to calculate a zero time
23 situation, use the volume of central compartment
24 which is really a zero time in my opinion, and the
25 dose was given an hour later, I mean the level, the
concentration was measured an hour later.



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Q. Yes.

A. There was really no adequate information available to calculate that, not at that time.

Q. Not at that time?

A. At that time. Subsequently I think more information became available, and in fact some of our own work has I think helped a little bit in this direction. I could tell you nowadays with more precision I think what I would have expected.

Q. In the summer of 1982, we know that Dr. Kauffman for the sake of doing a similar calculation used a volume of distribution of 1.3 litres per kilogram; and Dr. Hastreiter, I understand that that is a volume of distribution which has been confirmed or corroborated by your own research as being appropriate to a point in time about an hour after administration.

A. Actually our work really deals with premature babies, and the volume of the central compartment in premature babies is smaller than it would have been in the babies we are talking about here.

Q. Yes.

A. Probably by a factor of 2, I



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would say, it probably would be one-half of what we
would expect. So I would say, yes, the fact, the use
of a value of 1.3 would be more or less appropriate
for zero time, not for one hour. I think at one hour,
from our own studies, we found that you would have to
double its value, because there already has been
considerable distribution by an hour.



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And by 3 hours you would have to multiply this factor by 5, and then by 6 hours or so you would have complete distribution so you multiply by approximately 10, and that would give you the steady state volume of distribution.

Q. Dr. Hastreiter, I think you are referring to a paper that was published earlier this year and which has already been marked as an exhibit in these proceedings.

A. Right.

Q. I have forgotten the number for the moment. I don't think we need to refer to it and I can remind you later of the exhibit number if I may.

A. All right.

Q. Dr. Hastreiter, I happen to know that you have my handy dandy calculator sitting beside you in the witness box.

A. Right.

Q. If I understand you an appropriate volume of distribution for a child such as Justin Cook, assuming a level taken an hour after administration would be be what, in the order of 2 to 2½ litres per kilogram?

A. I would say it would be about 2½.



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Q. Right. I wonder, please, if you would do a calculation for me taking the level of concentration to be 72 nanograms per millilitre, Cook's weight being 5.37 (if you want to round that out to 5 kilograms I am content) and assuming that your opinion is right that administration occurred at approximately 3:30. That is to say an hour before the sampling at 4:30 and therefore using a volume of distribution as you have suggested of 2.5 litres per kilogram.

That I think would give you a calculated dose, would it not?

A. It would be around 1 milligram.

Q. 1 milligram. As I understand it it would be 2 of the adult ampoules?

A. Right.

Q. Or 10 times that number of the pediatric ampoules?

A. It is 0.3 mg. more exactly.

Q. 0.8?

A. Yes.

Q. I'm sorry, that is less than 1 mg.

A. A little bit less than 1 mg.

Q. Yes. That is right. Almost



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2 adult vials?

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A. Taking a weight of 5 and 2.5

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for the volume of distribution and 70 for the concentra-
tion of the blood.

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Q. Dr. Hastreiter, on the basis

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of your own research as to appropriate volume of

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distribution to plug into such a calculation, and

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assuming your opinion is correct that administration

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of this dose probably occurred around 3:30 in the

11

morning, is the dose you have just calculated, that

12

is to say something under 1 mg., in your opinion an

13

appropriate dose to contemplate in the case of

14

Justin Cook as a realistic size dose?

15

A. I think it is appropriate but

16

I wouldn't argue if somebody would come up with a

17

dose of 0.5.

18

Q. Right.

19

A. Or a higher dose of 1, 1.2.

20

Q. I accept that and I agree

21

there is no magic.

22

A. Right.

23

Q. But is it the order of dose

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that you would think to be appropriate as a realistic

25

estimate?

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A. I think it is much more

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realistic than 4 mg.

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Q. I take it, doctor, just to

update your view, if I didn't do it yesterday, is it
still your view today as you told me it was yesterday -
you told me it was earlier - that Justin Cook died
of digoxin intoxication resulting from an unprescribed
and very large dose of digoxin?

A. Right.

Q. Now, considering the case of
Justin Cook did you consider the possibility that
digoxin may have been administered to him by error?
That is to say, given instead of some other drug?

A. Yes. We have considered I
think every possibility that we could think of.

Q. In light of the order of
magnitude of the dose that you just calculated I
take it it is inappropriate to think that he got
someone else's dose of digoxin because no one else's
dose of digoxin would have been in the order of a
milligram?

A. No.

Q. And therefore the kind of
error that one has to contemplate as at all possible
is confusion of drugs, is it not?

A. Right, because it would be a



Hastreiter
dr.ex. (Lamek)

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compounded error. If he had received digoxin from somebody else not only would they have had to mix up the patients but also the dosage --

Q. Yes.

A. -- would probably be 10 times higher or more than it should have been.

Q. Yes.

A. So it would be a very difficult error to make.

Q. Having formed the opinion as you did that the likely time for administration was approximately 3:30 in the morning, did you see any basis in the chart for believing that there may have been a medication error which resulted in Justin Cook's receiving a large dose of digoxin?

A. I don't remember what medication he received.

Q. Would it be useful for you to look at the chart?

A. Yes. Could I have the chart?

Q. I should think it should be there beside you in one of the piles there.

A. This is it, thank you.

The medication that was given at 3:45 was I believe propranolol, but I am reading this from



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the nurse's notes.

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Q. I am looking for the medication sheet and I confess I cannot put my hand on it at the moment. We have got flow charts and all sorts of lovely things but no medication sheet.

THE COMMISSIONER: There is a medication sheet at 17. Have you got that?

MR. LAMEK: Q. It is on page 17.

A. Yes. That is oral propranolol.

Q. Oral propranolol.

A. Yes.

Q. But of the standing orders for medications there doesn't appear to be anything administered at any time close to 3:30 in the morning of the 21st, but we do know, doctor, that there was some intravenous Inderal or propranolol administered at about 3:45. You were aware of that when you reviewed the chart?

A. Yes. I believe it was 0.4 mg. and then sometime later another 0.2 mg.

Q. That is right. They were millilitres I think, doctor. They are so recorded on page 27 of the chart in Dr. Kantak's note.

THE COMMISSIONER: Also on page 30.

THE WITNESS: Millilitres should



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translate to milligrams because 1 mg. to 1 millilitre.

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MR. LAMEK: Q. 1 to 1 in that

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preparation, is it not?

5

A. Yes.

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Q. Dr. Kantak's note is the

7

one that begins about a third of the way down page 27.

8

In the second paragraph of the note he says:

9

"Initially I was given Inderal 0.4

10

millilitres to which he did not

11

respond. Another..."

12

I can't read that. "

13

"...0.2 milligrams..."

14

That is right?

15

A. Yes.

16

Q. "...and responded partially.

17

Was pushed."

18

A. Yes.

19

Q. Now, Dr. Hastreiter, might that

20

be a candidate for an occasion of drug error at 3:45

21

in the morning?

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25



D
BB/cr

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A. It is not impossible. The amount here then would have been 0.4 millilitres of the medication.

Q. 0.6 in all, would it not?

A. 0.6 total.

Q. Yes.

A. If they had used the same.

Q. Yes.

A. 0.6 of the, let's say, adult vial for digoxin, if there had been a mix-up would have contained approximately 0.2 milligrams or so, which really would not have been enough to account for the problem, according to our calculations.

Q. Does the fact that on this hypothesis the digoxin would have been administered a little later than 3:30, that is to say 3:45, 3:55 assist to reduce the amount of drug required to produce the level that we have talked about?

A. Certainly it would reduce it but I think the minimum dose, if the digoxin was given at the time when the sample was drawn at time zero.

Q. Yes.

A. The minimum that we calculated was around 0.8 I believe and therefore it cannot



1
2 be lower than that.

2
3 Q. Dr. Spielberg in his
4 calculations produced a minimum dose I tell you
5 of about one-third of a paediatric vial.

6 A. Oh, I didn't calculate the
7 minimum. Yes, the minimum would be about 0.5 or
8 so. But I can - let me do it for a second.

9 Q. Well, if you wish to, Doctor,
10 but perhaps I can just ask you this before you do
11 it. And it may or may not be necessary for you to
12 do the calculation. Do I understand you to be
13 saying that if the dose of what was believed to
14 be Inderal at 3:45 and 3:55 aggregating 0.6
15 milligrams was in fact digoxin you would still
16 have some serious question as to what that size
17 dose could produce at 4:30 the results observed,
18 the level and ultimately death?

19 A. Definitely.

20 Q. Okay. If that be your view
21 it may not be necessary to do the calculation but
22 if you would like to by all means go ahead.

23 A. All right. Yes, the
24 minimum, according to my calculation, would be
25 around 0.5, 0.45 I get, which is very close to
0.5. That is using a 1.3 volume of central



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compartment which I would think is appropriate for
a baby this size.

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Q. Okay. Dr. Hastreiter, thank
you for that. Could we move on to Allana Miller,
please. You scored the severity of this child's
cardiac problems as 5 on your scale of 1 to 10 and
I would take it that that means that you did not
consider her to be grossly sick in respect of her
cardiac condition, is that fair?

A. Yes. She had a serious type
of heart problem and she had definite signs of
congestive heart failure but it was a situation
that could have been repaired by surgery and they
had an ultimate prognosis apparently that would not
have been bad.

Q. As at the time of her death
or immediately prior to her death, was her cardiac
condition in your view, upon reading the chart,
an imminently life threatening one?

A. I don't believe so. She
was admitted to the Hospital because of her fever
and infection and seizure but then she stabilized
and her status was described as reasonably stable
before this terminal incident occurred.

Q. Now, in terms of toxicological



1 data we have only here post mortem blood levels
2 and notably one of 78 nanograms per millilitre,
3 although, we do know that at the time of her
4 administration to the Hospital March 19th she
5 had a digoxin level of 0.6 nanograms per millilitre.
6 You were aware of those numbers I take it when
7 you reviewed this chart?

8 A. Yes.

9 Q. We also know that Mr.
10 Cimbura recorded very low levels. Indeed, in the
11 fixed tissues from this child, I can refer you to
12 the report if it be necessary, it was Exhibit 95A,
13 Mr. Commissioner, at page 5. Mr. Cimbura reports
14 that in left ventricle, atrium and septum the
15 tissues were found to contain between 5 and 7
16 nanograms per gram of a mixture of digoxin and
17 digoxin-like substances and then apparently after
18 HPLC and a renewed RIA he reported only traces of
19 digoxin were present in the combined tissues. In
20 the lung tissue no digoxin could be detected,
21 although, he detected 4 nanograms of digoxin-like
22 substances. Those are minimal concentrations of
23 course, are they not, Dr. Hastreiter?

24 A. Yes, they appear to be; fixed
25 tissue though.

Q. I am sorry?



5

1

A. Fixed tissue.

2

Q. Fixed tissue, yes. Are you

3

able to make anything of the minimal levels in the
4 fixed tissues of this child. Is the fact that the
5 readings are minimal of any significance in your
6 view?

6

A. No. I find it very difficult

7

to use fixed tissues from a quantitative standpoint

8

except perhaps on a situation where the level is

9

very high. I think a low level, there is so much

10

variability that it is very difficult to predict

11

what level in the fresh tissue would have been.

12

Q. All right. Is it possible

13

that the concentrations in these tissues when fresh
14 may have been higher than as recorded by Mr.

14

Cimbura?

15

A. Oh, it is very likely. They

16

would have been considerably higher. The level in

17

fixed tissue is many, many times smaller than that

18

in the fresh tissue.

19

Q. But I take it you are not

20

able to say how much higher the fresh tissue

21

concentrations might have been?

22

A. No, that is difficult to do.

23

Q. And I take it you are not

24

able to say whether the fresh tissue levels could

25



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have been at a level that you would think to be
consistent with the concentration recorded in the
blood?

5

A. I think that is very difficult
to do.

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8

9

Q. Well, do I have it correctly
then, essentially the only toxicological information
of any significance here is the post mortem blood
concentration?

10

A. Yes.

11

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Q. And from that one piece of
information and here, Dr. Hastreiter, I hark back
to the discussion we had yesterday about Justin
Cook. From that one piece of information do you
feel able to estimate the size and time of the dose
which could produce such a level?

17

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21

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A. I think this again would have
to be done with the reservations that I have for
Justin Cook and perhaps even more so here, because
in Justin Cook's case we had myocardium and here
we have only the blood specimen. However, I believe
that one could attempt to calculate the dosage
given, assuming again the volume of distribution
and timing and so forth.

24

25

Q. Okay. I know you tried to do



1
2 it and I guess we should look at the exercise.
3 It is set out on page 25 of the binder in two
4 short paragraphs. The second paragraph takes into
5 account, as I understand it, the fact that we are
6 dealing here with a post mortem sample which may
7 be subject to the commonly encountered multiplier
8 effect after death. We don't know just what
9 multiplier to apply, you have suggested 1, 2 or
10 3 times the ante mortem blood level it could be.
11 And on the basis of those different multipliers
12 and working therefore back to what you inferred
13 to be the possible range of ante mortem blood
14 concentrations you produced dosages of $2\frac{1}{2}$, 5 and
15 $7\frac{1}{2}$ milligrams?

14 A. Right.

15 Q. Once again I take it, assuming
16 steady state of distribution?

17 A. Assuming steady state of
18 distribution.

19 Q. Right.

20 A. And using a volume of
21 distribution of 17 litres, which is high.

22 THE COMMISSIONER: Shouldn't that be
23 the other way around? Am I wrong? For 1, 2 or 3,
24 if you are going to use respectively should it not
25



1
2 be the other way around. If the post mortem is
3 equal to the ante mortem then surely you would
4 need a higher dosage, would you not, to reach that?

8 THE WITNESS: Well, if the post
5 mortem is three times higher.

6 THE COMMISSIONER: Yes.

7 THE WITNESS: That means the pre
8 mortem will be lower. So, it should have been the
9 other way around, yes.

10 THE COMMISSIONER: Yes, it should be
11 respectively, which would be 7.5, 5.0 and 2.5.

12 THE WITNESS: That's right.

13 MR. LAMEK: That's right.

14 Q. Well, let's be absolutely
15 clear about that. The three possible multipliers
16 that you used, if it is a one to one and the ante
17 mortem was in fact 78 as the post mortem was, then
you calculate a dose of $7\frac{1}{2}$ milligrams?

18 A. Yes.

19 Q. Using a volume of distribution
20 of 16 litres per kilogram. If on the other hand
21 there has been a two times multiplier and the ante
22 mortem level was of the order of 40, then you would
23 calculate a dose of 5 milligrams; if there was a
24 three times multiplier and the ante mortem level was
25



1
2 of the order of 25 or 26 then you would produce
3 a dose of $2\frac{1}{2}$ milligrams?

4 A. Right.

5 Q. But again, subject as we have
6 said to the discussion we had about Justin Cook
7 that the assumption of steady state being
8 represented by that ante mortem level, whatever it
9 was, 25 to 78, is probably an invalid assumption.
Is that fair?

10 A. Yes.

11 Q. Okay. Isn't the difficulty
12 this though, Dr. Hastreiter, that once you reject
13 the assumption of steady state distribution you do
14 not in the absence of fresh tissue concentrations
15 have any idea what kind of volume of distribution
to plug into your calculation?

16 A. Yes, that is a very serious
17 problem.

18 Q. That's right. Because indeed,
19 since you do not know whether there has been any
20 distribution of this dose to tissues, it may be,
21 it is conceptually possible that the levels taken
22 or that the ante mortem level was achieved within
23 a very, very short time of administration of the
dose?

24

25



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A. Yes.

3

Q. And death intervened before

4

there could be distribution?

5

A. Right. So, what one could

6

do is to calculate a minimum level here, a minimum dosage.

7

Q. And that I take it would

8

be something very substantially less than the dosages

9

you have calculated?

10

A. Yes.

11

Q. Yes. Now, when you gave

12

evidence at the preliminary inquiry, and this is

13

found at page 72 of Volume 33, you gave your

14

calculated dose as approximately 2½ milligrams,

15

and that I take in part reflects the use of a lower volume of distribution and 16 to 10 litres per

16

kilogram?

17

A. Right.

18

Q. And you indicated the range

19

of possibilities not with particular reference to

20

the post mortem multiplier variable but just in a range of dosage?

21

A. Yes.

22

Q. You said 1¼ to 5 milligrams?

23

A. Right.

24

25



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Q. Picking on $2\frac{1}{2}$ as being

3

somewhere around the mid point?

4

A. Right. I calculated the

5

minimum dose using a volume of central compartment

6

of 1.3 and a multiplier of 2 as being around the

7

0.25.

8

Q. Yes. And you said, and this

9

is at page 73 also, that if the dose were administered

10

by IV bolus injection, page 73, I am sorry, you

11

said that if the intravenous medication was used,

12

the expected onset of the effects would have been

13

from 5 to 30 minutes, that is so, and it was your

14

opinion that you would think the dose to have been

15

given about half an hour before the time of this

16

child's arrest; the arrest having occurred at 2:45?

17

A. I think that would be a good,

18

reasonable assumption.

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Q Dr. Hastreiter, how do you know that, or, how can you form that opinion?

A If one assumes that the cardiac arrest resulted from digoxin intoxication, and if the dose was given intravenously; and knowing what the time expectancy would be for the effects to occur following an intravenous bolus, the initial effect would be observable by 5 to 30 minutes, and the peak effect from 30 minutes to 4 hours, or from 1 to 4 hours essentially. You would have to work within that time frame more or less. Usually what we do is use sort of average values and medium values to try to get as close as possible, knowing full well that the error can be very large.

Q Isn't the difficulty with that that you have to start by assuming the very thing that is in issue, that is to say that the arrest was caused by digoxin intoxication?

A In my opinion this is a valid assumption in a child that is not expected to have an arrest and who develops one and then has a very high blood digoxin level.

Q I guess the difficulty I am having is this, and you must help me with it if you can, please; is that in the absence of evidence of



E.2

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distribution of the dose to tissue, one cannot
preclude the possibility that dose was administered
very shortly before death?

4

5

A. True.

6

Q. And not prior to the arrest?

7

A. Oh, I see. Yes, there was a
considerable interval between the arrest and death.

8

Q. The arrest was at 2:45.

9

A. And death?

10

Q. And death was around 3:27 as I

11

recall it. I guess my difficulty is this, and I think
you have partly solved it; if the digoxin was not
administered prior to the arrest and didn't cause the
arrest, that is, if I understand you correctly, your
quandary is what did cause the arrest, am I right?

14

15

A. Right.

16

Q. Because the arrest in your view

17

on the clinical picture of this child was not some-
thing to be expected?

18

19

A. Right. Again, I would assume
that the child was resuscitated and the time of death
is somewhat arbitrary.

20

21

Q. Somewhat arbitrary?

22

A. Yes.

23

Q. Well, Doctor, are you doing this,

24

25



E.3

1
2 are you putting together the otherwise unexplained
3 arrest with the high digoxin level blood and serum
4 concentration and saying the likelihood is that the
5 digoxin caused the arrest, not that the arrest
6 happened independently of digoxin, is that what you
7 are saying?

8 A. Yes, that is what I am saying.
9 I think we usually try and put these things together.
10 Rather than seek for multiple causes to explain an
11 event we try to combine as many as possible and end
12 up with just one combination of factors rather than
13 multiple separate factors to explain an event.

14 Q. Do I understand it correctly,
15 Doctor, that that opinion cannot be as firm in the
16 case of Miller as it was in the case of Cook; because
17 with Cook you had an additional piece of evidence
18 to demonstrate that a period of time must have
19 elapsed between administration and death?

20 A. Definitely. I think the question
21 of the timing of the administration becomes much more
22 of a problem.

23 Q. If you are correct, Doctor, in
24 your view that digoxin caused the arrest and was
25 likely administered some time in advance of 2:45,
perhaps as much as half an hour prior to 2:45, I



E.4

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take it you would go through an exercise similar to that in the case of Cook, plugging in a volume of distribution appropriate to that time interval between administration and arrest and arrive at a likely order of dose administered to this child?

A. Right.

Q. And I take it that would be something very substantially less than the 2-1/2 milligrams that you suggested at the Preliminary Inquiry?

A. Yes, it would be.

Q. I don't ask you to do it, I think we can do it just as easily, but since you have my calculator maybe you could do it very quickly and just give us the results.

Allana Miller weighed a little over 6 kilograms, and what post mortem multiplier are you going to take?

A. 2 is the average.

Q. So we posit an ante mortem serum level of 40?

A. 40, and the time interval would be an hour, that means that the volume of distribution would be approximately 2.6, that would be, that would give me a value of 0.6 approximately.



E.5

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Q If that were a precise number it would be a little more than one adult ampule, recognizing that it cannot be a precise number but merely indicative of a range where you are suggesting I take it slightly less or slightly more than an ampule?

A. Right.

Q An adult ampule?

A. I think we earlier had calculated the minimum possible dose was to be around 0.4, so this is a little bit higher but it revolves around 0.5.

Q I confess, Doctor, there is one thing that puzzles me about your calculation of a minimum dose and it is this; I would have thought, and please tell me where I am erring, I would have thought that if one wanted to calculate a dose necessary to produce a known serum concentration at zero time, that is to say immediately after the giving of the dose, one would not plug into the calculation a volume of distribution at all, but would merely take the known concentration per millilitre and multiply it by the total volume of blood in the circulatory system?

A. Well, it basically would amount



E.6

1
2 to the same calculation. When you use the zero time
3 factor for volume of distribution, you are not using
4 the alpha or beta factor in your calculation. All
5 you are doing is you are extrapolating back the zero
6 and you are using the concentration. You are doing
7 the same thing, except how do you get the concentration?
8 You have to simply extrapolate back to zero which is
9 an artificial thing to do. We tried to do it for
10 instance to sample as close as possible to the time
11 of administration. It is not easy to do, because
12 if you are off by a few seconds, you know, there is
13 a tremendous fall in the early phase of your alpha
14 distribution, but basically it is the same thing.
15 What you are doing, you are simply taking the dose
16 and dividing it by your concentration, by your zero
17 concentration, and that will give you the volume in
18 which it must have distributed since the total dose
19 produced the final concentration.

20 Q No doubt my slowness is disabling
21 me from following that clearly, maybe I will be able
22 to follow it more clearly from the transcript.

23 I take it, Doctor, from what you have
24 said earlier, Dr. Hastreiter --

25 A See, perhaps another way to
explain it would be that --



E.7

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Q. Yes.

3

A. That concentration simply means

4

the amount per volume.

5

Q. Yes.

6

A. If you multiple the concentration

7

times volume you get your dose.

8

Q. Yes.

9

A. Your total dose.

10

Q. That is right.

11

A. Okay. You gave let's say 5

12

milligrams and you got your final concentration of

13

1 milligram per ml, you are dealing with 5 ml's,

14

because you have 5 milligrams, you have 1 milligram

15

per ml times 5 will give you the total. So if you

16

divide your dose by your concentration you get your

17

volume, or if you multiply your volume by your

18

concentration you get your dose.

19

Q. What volume of serum is there

20

in a 4 kilogram child?

21

A. Volume of blood.

22

Q. All right, volume of blood.

23

A. It is about 80 cc's per kilo

24

which is about 320 - 4 kilos.

25

Q. I just want to understand the

principle, 80 cc's per kilogram?



E.8

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A. Per kilogram.

3

Q Even I know enough metric to

4

know that is considerably less than 1.3 litres per
kilogram.

5

6

A. Yes, but the digoxin doesn't
just distribute in the blood itself.

7

8

Q That is where it initially is,
isn't it, Doctor?

9

10

A. Yes, but that is again an
assumption, you know, nothing takes place at all.

11

When you talk about volume of distribution, when you

12

calculate it, is that you are essentially taking

13

into consideration the compartment in which there is

14

this initial mix, very fast. By definition they say

15

it is very fast profused tissues plus the blood. Of

16

course you can't really measure it instantaneously,

17

but it applies for the first minute or so of your

18

injection and it is not just the blood volume but

19

also the volume of interstitial fluid in which it
mixes.

20

Q I think I understand it now,

21

Doctor. Are you therefore suggesting that if one

22

were to calculate, attempt to calculate a dose by

23

taking a known concentration per millilitre and

24

multiplying that concentration by the number of

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E.9

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millilitres of blood in the child's body, one would
be creating a very artificial construct?

3

4

A. Yes, you could only apply that
for a drug that stays in the bloodstream which very
few will do.

5

6

7

Q. And not for a drug like digoxin
which I understand begins immediately to distribute
in tissue?

8

9

A. Right. But there are some, as
you know, you had a lot of discussion about this
earlier I am sure by others, tissues such as the
heart, or skeletal muscle, where the distribution is
fairly slow, and this type of distribution is what
takes so long to get the steady state.

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Q. Doctor, I take it to be implicit
in what you have already said that in your view the
arrest of Allana Miller was caused by digoxin. Let
me be plain, did you see anything in the clinical
condition of this child, as disclosed in the chart,
that explained to your satisfaction why at 2:45 on
the morning of March the 21st she should suddenly
have suffered, as I recall it, marked bradycardia,
hypertension, generalized seizure, cardiac arrest?
Is there any explanation that satisfied you in her
clinical condition for those events?

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E.10

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A. No. There is no explanation that satisfied me. I should say in all fairness that she had an arrhythmia, she had a low heart rate, and she was sick at the time of admission to the Hospital, and this was obviously a sick baby, also chronically ill.

Q. She had chronic congestive heart failure, did she not?

A. Yes, very severe and in fact she was scheduled to have surgery later in the month I believe.

Q. She had a history of brady arrhythmia, did she not?

A. She had a history of brady arrhythmias and for this reason actually the digoxin had been held frequently and had been reduced to a very small dose.

Q. Yes.

A. And her blood level was only 0.6 earlier, or had been a few days earlier.

Q. But is it your opinion that her history of brady arrhythmias, her continuing and severe congestive heart failure do not provide sufficient explanation for the decline and arrest that she suffered on the morning of March 21st?



E.11

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A. That is correct, I don't think they explain this sudden abrupt terminal deterioration. Her blood level was 0.6 two days before she died.

Q. Yes. You told me yesterday in the context of Justin Cook where too there was a note in the chart of general seizure in the child, that such seizures are known to be symptoms of acute digoxin intoxication in children, I think you said.



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A. In adults also, yes.

Q. In adults also. We have seen

the same thing with Allana Miller where there was some generalized seizure activity as part of the terminal events?

A. Right. Of course seizures can be caused by many, many different things.

Q. Yes.

A. And I think one has to be very careful in trying to interpret the symptoms, but it certainly can be part of digoxin toxicity, digitalis toxicity.

Central nervous system involvement is an important facet of digitalis toxicity, and there are situations where this central nervous system involvement will be very prominent and in fact there have been instances - there was a case at this Hospital, The Hospital for Sick Children, reported by Dr. Fowler in his series, where the child apparently received a very large dose of digoxin and died accidentally many years ago, but the main manifestations were not the heart but the central nervous system and the child had brain damage, convulsions.

Also in experimental animals, for instance in the rat, it is often difficult when you



F2

1
2 give the rat a high dose of digoxin to produce any
3 heart problems because the heart, the myocardium is
4 very resistant to digoxin, but you get central
5 nervous system disease. This is how you kill rats
6 with digoxin.

7 Q. It is certainly worth knowing
8 that.

9 A. Well, the main poison used
10 for rats is not digoxin. It is coumadin, like di-
11 coumarol, which is a blood thinner. They don't like
12 that either.

13 Q. They don't like that either.

14 Other than the paper of Dr. Fowler's
15 which has been marked in evidence here, Dr.
16 Hastreiter, are you aware of other reports in the
17 literature of seizure activity being recognized as
18 a symptom of digoxin intoxication?

19 A. Yes. It is a classical
20 finding which was I think originally described by
21 Withering who discovered the foxglove, and in textbooks
22 if you take Goodman and Gillman, a textbook of
23 pharamcology, you will find convulsion listed as one
24 of the side effects, and other textbooks, and there
25 have been a number of isolated reports. I do not
have the exact references.



F3

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Q. Thank you. If I understand you correctly then, Dr. Hastreiter, it was in 1981 and 1982 and it is still your opinion that Allana Miller died of digoxin intoxication caused by an unprescribed administration of a large overdose of drug, probably in your best judgment at about 2:15 in the morning; half an hour before her arrest?

A. Right.

Q. Do I have your opinion correctly?

A. Yes.

Q. And are there any other facts other than those which you and I have discussed this morning upon which that opinion is based? Is there anything that we have omitted as an important part of your thinking in arriving at that opinion?

A. I don't believe so.

Q. Now in reading the chart of Allana Miller did you observe that at 2:40 in the morning, five minutes before her arrest, she received an intravenous of Lasix?

Perhaps we should look at her chart. I'm afraid, doctor, you will find that the progress notes in this chart are rather muddled. They start at page 33, go to 34 and then recontinue or resume at



F4

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page 41.

3

A. Okay. Lasix --

4

Q. At page 42 --

5

A. Yes.

6

Q. -- there is a notation that

7

Dr. Soulioti came to examine the child who seemed to
be getting into trouble and administered Lasix, 6 mg.

8

by IV push at 2:40.

9

A. 2:40, yes.

10

Q. At 2:45 seizure activity

11

began. No heart rate could be heard and a Code 25
was called.

12

A. Right.

13

Q. Perhaps we should put the whole
sequence of events together.

14

15

At 1:45 apparently the heart rate

16

was noted to be 54 and very irregular.

17

Upon stimulation the heart rate came

18

up into the 70s and that happened three or four times
and gagging and vomiting occurred.

19

Then apparently by that time Dr.

20

Soulioti came and administered the Lasix, 6 mg. by IV
push.

21

22

A. Right.

23

Q. Now we know from your recent

24

25



F5 1
2 paper, which is Exhibit 276 I think, that unlikely
3 as it may seem Lasix or furosemide can be confused
4 with digoxin.

5 A. Right.

6 Q. I don't ask you to speculate
7 on the likelihood that that happened here, but if it
8 did occur and if indeed at 2:40 in the morning what
9 was thought to be 6 mg. of Lasix in fact was translated
10 into an equivalent volume of parenteral digoxin, and
11 I will ask you to calculate the dose that that would
12 involve, could that in your opinion have caused the
arrest of Allana Miller five minutes later?

13 A. I don't believe so because
14 the Lasix, the concentration of a vial is 1 to 10 mg.
15 per ml. I believe. Yes. And 0.6 ml. then --

16 THE COMMISSIONER: I'm sorry, doctor,
17 the concentration was what did you say?

18 THE WITNESS 10 mg. per millilitre.
19 So -- or 6 mg. of Lasix would be 0.6 millilitres, and
20 0.6 millilitres of let's say the adult solution of
21 digoxin which contains 0.25 per ml., would be 1.5 mg..
22 Approximately what we calculated earlier for I think
23 Justin Cook also.

24 MR. LAMEK: Q. Yes.

25 A. Would be 0. -- what did I say?



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Q. Let's go through that calculation.

A. 0.15 mg., 150 micrograms. I think for Cook I have said in the neighbourhood of 200. It is more exactly 6 times 0.025 which would be 0.15 mg.

Q. Yes.

A. Or 150 micrograms.

Q. Yes.

A. This is too small a dosage in my opinion to result in the blood levels we are talking about sometime later which would have been a good hour later or so.

Q. Yes.

A. And killed the child.

Q. May we go on then to the case of --

A. The calculation I think is correct. You have 0.25 per ml. of adult solution of digoxin. Okay?

Q. Yes.

A. That is 250 --

Q. 250 micrograms.

A. Micrograms, so each 10th of a ml. is 25 micrograms, times 6 would be 150 micrograms.



1
F7 2 Q. Which in your opinion is not
3 a sufficiently large dose --

4 A. Right.

5 Q. -- to produce arrest five
6 minutes later or a level of 78 post mortem. In fact,
7 a level of perhaps 40 ante-mortem.

8 A. Right.

9 Q. Can we move then to the case of
10 Kevin Pacsai.

11 You gave to this child a severity
12 rating of 2 with respect to his cardiac problems. I
13 take it that reflected essentially the fact that the
14 heart of this child was essentially structurally
15 normal?

16 A. Right.

17 Q. But we do know that the baby
18 had been very sick in Hamilton before coming to
19 Toronto. Is that your recollection from reading the
20 chart, Dr. Hastreiter?

21 A. Yes. The baby had been
22 hospitalized at St. Joseph's Hospital I think.

23 Q. Initially at St. Joseph's and --

24 A. And then was moved to McMaster,
25 yes, because of paroxysmal tachycardia and was very,
very sick, in cardiogenic shock.



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However, responded well to treatment and by the time of the baby's transfer to The Hospital for Sick Children was in stable condition; had recovered from the acute insult and was transferred here actually for workup; not necessarily for treatment of that episode but for a workup of his conduction system problem.

Q. Because he was known to have some problem with the conduction system?

A. Yes. He had episodes of bradycardia and tachycardia.

Q. Yes.

A. Slow and fast heart rates which alternated, and it sounded from the description like what one would generally label as ^{sick}/sinus syndrome.

Q. Yes.

A. Although I don't have enough information, you know, really to be absolutely certain about that.

Q. Did you form any opinion as to the nature or cause of the child's problem at St. Joseph's Hospital? What was wrong with him? What caused those very serious symptoms to appear?

A. Well, the occurrence of paroxysmal tachycardia (that is a sudden tachycardia) which usually originates in the upper portion of the



F9

1
2 heart, the atrium or junctional tissues, is not
3 infrequent and if not treated promptly, if let go for
4 a while, especially if it is maintained for more than
5 let's say twelve hours or so, the child can be
6 extremely sick because the heart cannot keep up with
7 this very fast rate. The rates go up to around 300
usually.

8 Q. Yes.

9 A. And children will become
10 very, very sick and if not treated they can die,
11 although that doesn't happen very frequently these
12 days because of the medical care that they receive.
13 But that is what happened I am sure.

14 And this happens very often with a
15 perfectly normal heart. It may be a transient condi-
16 tion that young babies have and will go away
17 eventually spontaneously, so all we have to do is
18 treat them for a year usually with digoxin which is
19 usually the drug of choice in little babies and it
20 will go away. After a year we stop the drug. They
usually never have it again.

21 That is assumed to be because of
22 immaturity of the conduction system of the heart. The
heart has not matured appropriately.

23 Q. Were you aware in reviewing
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this chart, Dr. Hastreiter, that while in Hamilton
this child's blood chemistry had been rather haywire?

A. Yes.

Q. All sorts of electrolyte
embalances, elevated blood sugar and so on?

A. The child was extremely
acidotic and that is not unusual for a child who has
what we call cardiogenic shock. There is practically
no circulation going so the acid metabolites
accumulate in the blood; extreme acidosis and then
there is probably an element of renal failure also
with a high potassium level.

I think the high creatinine - if I
could check - yes, the serum potassium was as high
as 7.4. The pH was as low as 6.9, which is very low;
serum creatinine was high at 1.3 indicating that there
was a renal failure component.

That was an acute insult which we
see in a situation like this. The child was treated
and a few days later the situation normalized. The
potassium was back to normal. Sodium, electrolytes
and so forth, blood gases.



BmB.jc
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A. Now, terminally there was another high potassium level.

Q. Certainly, I want to come to that one, Dr. Hastreiter, but where a child in his early days has experienced an acute episode of the kind you have just described, would you as a clinician expect to see a recurrence of such episodes?

A. No, I would not expect to see a recurrence of such episodes unless there was a recurrence of the tachycardia, which was never documented. I mean, this is easy to document if the heart goes around 300.

Q. Yes. Even with the kind of conduction problem that this child had, you would not expect to see a recurrence of the acute episode of the kind that he had in Hamilton?

A. It is possible that he might have had a recurrence at some other time but he did not have a documented recurrence while he was hospitalized at McMaster or at The Hospital for Sick Children because it was never so stated. It was indicated that he had some short transient episodes of bradycardia and I believe tachycardia also but they were very short episodes and nothing sustained as his initial episode was.



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Q Do I correctly take it that the acute episode while the child was in Hamilton was indeed a life threatening episode?

A Oh, certainly. The child was very near death.

Q Yes. But that history prior to his coming to The Hospital for Sick Children and the known heart rhythm problem that he had, notwithstanding those things, you were still able to give this child a severity rating of 2 and not expect him to get into the kind of trouble that he did get into on March 12th. Is that fair?

A That is right. The usual story with babies having this type of problem is one that they will have this initial episode sometimes very, very serious and grave, life threatening, but once they are treated and the situation is controlled, they are perfectly healthy, normal babies. Sometimes they may be difficult to control with medications, that happens sometimes but not too often.

Q All right. I take it in short, Doctor, that upon your review of this chart and on a strictly clinical basis you saw no ready explanation for this child's arrest and death?

A Right.



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Q And was it for that reason, I refer you to page 81 of the binder, of your reports, was it for that reason that you rated this child as having a good probability of massive digoxin overdose?

A Right.

Q Now, once again, by the time you did your report on Pacsai, even your very first report, the ante mortem and post mortem digoxin levels were known, were they not?

A Yes.

Q Okay. So, you may or may not have been looking at this chart totally blind as far as the digoxin information was concerned?

A No, that's right.

Q All right. But nevertheless you saw nothing in the clinical picture to explain the arrest and death?

A No.

Q So far as the digoxin information is concerned we know that an ante mortem level in a sample drawn - the evidence has been about 6 and 6:30 in the morning after the child's admission to the ICU, and the ante mortem level in that sample was measured at greater than 10 nanograms per millilitre?

A Right.



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Q And we know that post mortem samples drawn at autopsy had recorded levels of 24 to 26, so, let's settle on 25 nanograms per millilitre.

A. Right.

Q With respect to the ante mortem level of greater than 10 nanograms, Dr. Hastreiter, on the face of it we don't know how high is up and how much greater than 10. Does the post mortem level of 25 give you any feel for what the actual ante mortem level may have been?

A. It would have to be between 10 and 25.

Q Yes.

A. And if you take, let's say, I would in this particular case expect it to be probably around, a little higher than 10, perhaps around 15 but not much higher.

Q All right. Incidentally, on page 83 of the binder, in your narrative comment on Kevin Pacsai, in the first paragraph under the heading Comments, a little more than half way down page 83, Dr. Hastreiter.

A. Yes.

Q The heading Comments and in the first paragraph a little over half way through the



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paragraph you have referred to the heart block that was experienced and the high serum potassium levels and you go on:

"A blood digoxin level obtained at 2100 hours of the day of admission (recheck time) was higher than 10 nanograms per millilitre, not sufficient quantity for further dilution."

I take it that that is the sample, the same sample that I referred to as having been taken between 0600 and 0630 on the morning of the 12th?

A. That is correct.

Q. Okay.

A. It wasn't clear at the time when the sample had been obtained.

Q. Right. Now, we are talking in the case of Pacsai and not of the grossly elevated levels that we have seen in the case of Cook and Miller. Are the digoxin levels that we are looking at here, that is to say, in your best judgment, between 10 and 15 ante mortem, 25 post mortem, are those digoxin levels in your opinion sufficiently elevated as to suggest a lethal concentration of digoxin in this child?



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A. They may or may not be. There have been certainly children who have lived with levels as high as these and there have been others who have not, who have died. So, there is a certain range where, you know, it is difficult to say. It could be fatal.

Q. Yes. Did you form an opinion upon your review of all the information available about this child as to whether the digoxin was indeed probably fatal?

A. Yes, I did. I felt that digoxin overdose here was a very good probability, possibility, because of the unexpectedness of the situation, the terminal event and the fact that the child had a normal, structurally normal heart and the fact that high levels were found in his blood pre mortem and post mortem.

Q. Now, we also have again fixed tissue concentrations here, Dr. Hastreiter.

THE COMMISSIONER: Yes, Mr. Olah?

MR. OLAH: Excuse me, Mr. Lamek. The witness answered that question in two different modes. He said initially very probably and then subsequently very possibly. I am wondering if my friend could take a moment to clarify whether the doctor's opinion is



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very possible or very probable?

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MR. LAMEK: I have forgotten the

question now. I asked you whether those levels were
in your opinion sufficiently elevated as to essentially
be capable of killing the child and whether you had
an opinion as to whether digoxin intoxication was the
probable cause of this child's death. Was that the
question?

MR. OLAH: Yes. I just wanted to see
whether it is very possible or very probable?

THE WITNESS: Very probable.

MR. OLAH: Thank you.

THE WITNESS: Yes, I had indicated so
in my reports.

MR. LAMEK: Q Now, as I said, we also
have some fixed tissue concentrations here,
Dr. Hastreiter, they are found at page 4 of 95A, sir.
If you will trust me I can recite them for you I think.

A. Yes, I have them here.

Q In the left ventricle 105 nanograms
of digoxin per gram, left atrium 103 nanograms of
digoxin or digoxinlike substances per gram, in the
septum 102 nanograms of digoxin per gram and in the
lung 48 nanograms of digoxin per gram. Dr. Hastreiter,
were those levels of any assistance to you in your



G.8

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consideration of this child's case?

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A. These levels are certainly high

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for a child whose heart had been fixed in Klotz

5

solution for three months. As I said earlier, I

6

hesitate to draw any conclusions or inferences

7

regarding quantitation in fixed heart specimens or

8

fixed tissues in general. This is more or less

9

approaching a level that I would be very suspicious

10

anyway, that is quite significant, because the usual

11

situation of a heart that has been kept in Klotz

12

solution for three months is to have levels below

13

10 or in that range, whereas, here we have levels

14

above 100. But this is as far as I would go.

15

Q. Okay. Now, you have told us

16

your opinion as to the probable cause of Baby Pacsai's

17

death. Is it your opinion that the elevated ante

18

mortem and post mortem blood concentrations indicate

19

the administration to this child of a digoxin dose

20

greater than a therapeutic dose?

21

A. Definitely.

22

Q. Okay. I want to go on to ask

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you whether you see any other possible explanation

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for the elevated blood levels of digoxin but I see,

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Mr. Commissioner, it is 11:30 on the button.

THE COMMISSIONER: Yes.



C.9

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MR. LAMEK: Can we take our break now,

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please?

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THE COMMISSIONER: Yes, twenty minutes.

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MR. LAMEK: Thank you.

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--- Short recess.

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H/DM/ak

---Upon resuming.

THE COMMISSIONER: Yes, Mr. Lamek.

MR. LAMEK: Q. Doctor, when we broke at the recess, Dr. Hastreiter, I said that I was going to go on to ask you whether you considered whether there might be other possible explanations for the elevated blood levels of digoxin, other than the administration of an unprescribed dose to the child. In particular, was there any indication of renal failure, or pre-renal failure in the chart as you read it?

A. Let me just look at the laboratory data for a minute.

Q. Yes.

A. No, as I indicated earlier there was a brief period while the baby was at St. Joseph's and McMaster, I think earlier, where this occurred. But subsequently the baby's situation stabilized, and at the Hospital for Sick Children the electrolytes were normal up until the very end phase; and BUN was less than 5 which is quite normal. So there is no indication of renal failure subsequently. The one episode that occurred earlier was a very transient one and it went away.

Q. Perhaps you could help me with



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3 one thing, Dr. Hastreiter; at page 25 of the binder,
4 which is part of the calculation of the doses which
5 accompanied your initial report.

6 A. Right.

7 Q. With respect to Pacsai, you
8 say at the bottom of that page:

9 "Assuming that the post mortem blood
10 concentrations of digoxin, which
11 averaged 25 ng/ml, corresponded to
12 twice the ante mortem concentrations,
13 the digoxin dose would have been the
14 same. If one assumes that the post
15 mortem level corresponded to the ante
16 mortem level, the digoxin dose would
17 have been about 1.5 mg. Because of
18 the possibility of renal failure in
19 this infant, one must view these
20 calculations with caution."

21 Now, before I ask you to explain why
22 in May of 1981 you were contemplating the possibility
23 of renal failure; I point out to you too that on
24 page 83 of your 1982 report, you say half way through
25 the final paragraph on page 83:

"The high blood potassium levels are
also consistent with either one of



"these conditions."

That is to say high digoxin or development of renal failure:

"I believe that evaluation of the other laboratory findings (serum creatinine, BUN, amount of urine output, et cetera) did not suggest renal failure."

I wonder, Doctor, what it is you knew in the summer of 1982 that you either did not know or was not available to you to know in the spring of 1981?

A. Well, I was sure that some of this information was not available. I can't tell you exactly which information, I believe the BUN values for instance were not available. I was wrestling with the high potassium level here.

Q. Yes.

A. Which I had to find an explanation for at the end, and I was especially concerned with the possibility of renal failure. I believe we can safely rule it out having added laboratory information on it.

Q. When you first reviewed these charts, Doctor, in May of 1981, were the biochemistry reports not included in the charts, or is it that



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you did not note them at that time and needed to check them later?

A. No, I would say they were included, most of them were.

Q. Yes.

A. But there was some information, some data was missing and was later recovered from the charts.

Q. Were you working with the original Hospital charts, or with copies of them made by the police?

A. The original charts.

Q. At the Hospital?

A. At the Hospital.

Q. With respect to the elevated serum potassium levels, because we know in fact on the night that he died there were two serum potassium levels done, in the early morning of the day that he died; at 6:30 in the morning a sample was reported as having 9.0 milliequivalence, but that sample was said to be slightly hemolyzed. A repeat sample was drawn at 7:20 and was sent for analysis and was reported as 7.7 milliequivalence. Certainly at 7.7 I take it there is no question that is a highly elevated serum potassium level.



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A. Right.

Q. Do you have any opinion, Dr. Hastreiter, as to whether the elevated potassium may have played a part in this child's death?

A. My feeling would have been and this is not unusual to find a high potassium in a child who receives a digoxin overdose. If one tries to combine everything, combine the terminal episode, the suddenness of the event with the expectedness of the event with the high digoxin levels, then to try fit in the high potassium levels, it would fit in quite well with digoxin overdose.

However, there are other possibilities for potassium, high potassium serum levels, and one will have to be a little careful in looking at them. I think we have ruled out renal failure pretty well, I think we can do it.

I was told that the possibility was brought up that high potassium level per se would produce a high digoxin level, or would raise the digoxin blood level, and in my opinion this is not true. I think the high - the potassium and the digoxin do compete with the same receptors and there is a physiologic interaction between the two. So that if one has a low potassium level one would be



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3 more sensitive to digoxin and vice versa, high
4 potassium level less sensitive. But as far as
5 high potassium raising the digoxin level per se,
6 that really is very difficult to document.

7 Q. May I interrupt you there?

8 A. Yes.

9 Q. We have certainly heard that
10 view expressed by Dr. Spielberg and Dr. MacLeod from
11 the Clinical Pharmacology Department at the Hospital
12 for Sick Children; and Dr. Kauffman as I recall it did
13 not agree with the proposition that high potassium
14 may cause high digoxin.

15 A. Right.

16 Q. And it is your view that is
17 not a substantiated proposition, is that what you
18 are saying?

19 A. Right.

20 Q. You are not aware of any
21 evidence or literature which would support that
22 proposition?

23 A. Exactly.

24 Q. Is there literature which
25 will support the proposition that an elevated digoxin
level may produce an elevated potassium level?

A. Oh, a great deal of literature,



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2 that is a very common observation really.

3 Q. Whether it works in reverse
4 is what, a matter of speculation in your view, or
5 is it possible?

6 A. I think one is really extrapo-
7 lating from a functional effect, that is the
8 potassium and digoxin are known to interact function-
9 ally, but that doesn't mean that one will observe
10 high levels of one when the other occurs necessarily.
11 I think it would have to be proven or better docu-
12 mented.

13 Now, going back to the high potassium
14 level; administration of potassium is a possibility
15 too, that I think would have to be considered but
16 very unlikely to have occurred, because to explain a
17 high potassium level and a high digoxin level would
18 have to be administration of two different substances
19 and I think that becomes unlikely.

20 The possibility of adrenal insuffi-
21 ciency as a terminal event perhaps should be
22 considered. I believe that I would expect the
23 sodium to be low, and I think the sodium level in
24 my opinion does not corroborate this, plus the fact
25 that at autopsy I believe the adrenals were
described as normal.



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Q. I think architecturally normal
is the way they were described.

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A. Architecturally normal.

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Q. And in size.

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A. So if there was adrenal
insufficiency it would have to have been a functional
phenomena which was not detectable anatomically or
histologically, and that I think becomes unlikely.

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Q. Dr. Hastreiter, may adrenal
insufficiency occur that is not detectable anatomically
or histologically?

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A. Yes, I am sure it occurs as
a transient phenomena, again as a functional type
situation. I don't know that it could be severe
enough to kill somebody or to make somebody extremely
ill.

17

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Q. Would one of the results of
such a condition be an elevated serum potassium
level?

19

A. Yes.

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Q. Would you also expect to see
a depressed sodium potassium level?

22

A. Yes.

23

24

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Q. And you have said you do not
see any depression in the sodium level?



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A. Right.

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Q. The biochemistry reports.

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Does that lack of a depressed sodium level militate against a diagnosis of adrenal insufficiency here in your view?

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A. I think it does. I think it is another piece of evidence against. I am not saying that it rules it out completely but it makes it a weaker case in my opinion.

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Q. Of all the possible explanations that you have just listed for the elevated potassium level, is there in your view anywhere in the chart any evidence which makes any one of those a more likely explanation than the presence of an elevated digoxin level?

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A. No. I think the presence of digoxin, the occurrence of digoxin intoxication is to me by far the most likely explanation.

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Q. From your review of this chart, Doctor, when, in your opinion, did Kevin Pacsai first display symptoms suggestive of digoxin toxicity; and the nursing notes in particular, for that particular period are found on page 65 to 68.

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A. Well, it is my understanding that the baby was well except for episodes of



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bradycardia until 3:45 a.m. on the day of his death.
At that time the nurses were concerned about the
baby's condition and consulted with the medical
staff and eventually the baby was transferred to the
ICU at around 6 o'clock in the morning.



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Q. Yes.

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A. So at 3:45 the baby was described

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as being lethargic and limp, not feeding well, and

5

he had heart rate changes. The heart rate varied

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from 60 to 150 with occasional 2 to 1 AV block. He

7

appeared to have seizure activity and stopped

8

breathing on two occasions but recovered and then was
transferred to the ICU.

9

This is a sort of a summary that --

10

Q. Yes.

11

A. -- well, from my own notes.

12

Q. Is it your opinion that the

13

observations recorded at 3:45 in the morning are

14

probably the observations of the first symptoms of
toxicity?

15

THE COMMISSIONER: Are you sure those

16

observations aren't at 4 o'clock. I don't know

17

THE WITNESS: I don't know. I was

18

trying to see the time --

19

THE COMMISSIONER: Yes, it is at

20

approximately 0400. You are absolutely right, sir,

21

but it covers a period starting at 3:45.

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MR. LAMEK: Q The observations

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appeared at approximately 4 o'clock?

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A. 4 o'clock.

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Q But are those the symptoms which in your best judgment, Dr. Hastreiter, are probably the first observed symptoms of digoxin toxicity in this child?

A. Yes, in my best judgment this would be the time when the baby really started deteriorating.

Q All right. Now if those were the first observed or even observable symptoms, and if we want to estimate when the dose was given, I take it we first have to ask what was the probable method and route of administration, do we not?

A. Yes.

Q Because that helps us to fix the time frame for administration.

Do you have an opinion as to the most likely route and method of administration to this child?

A. I think this is difficult to say in this particular baby, more so than any others we have covered so far because the level was not extremely high. It was considerably lower than in the others, and this time relationship here between this event at 4 o'clock, 4 a.m, and the time of the baby's death was six hours spread which is a long time



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2 compared to the others, so it is conceivable that
3 various methods of administration must be considered
4 I think. One would be an intravenous bolus; the
5 other one would be possibly even oral administration
6 although that would be probably difficult because the
7 baby had no nasogastric tube or any tubes in the
8 GI tract which would facilitate the administration
9 of medication.

10 I wouldn't rule out the possibility
11 of a continuous infusion even because of the level
12 not being so terribly high.

13 Q Are you able to express a view
14 as to the most likely of those routes? I certainly
15 don't ask you to if you don't feel comfortable.

16 A No, I would say from a practical
17 standpoint probably the easiest way to administer the
18 drug would have been intravenously, bolus intravenously
19 because the child had IV's in place and it would just
20 have been a matter of injecting the drug into the
21 system - through the system. Also faster and less
22 detectable perhaps than the other routes.

23 Q Doctor, if that be the most
24 likely route of administration it would follow from
25 what you told us yesterday that the first effects of
toxicity would likely have been manifested anywhere



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from 5 minutes to half an hour after the dose?

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A. Right.

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Q. If you are therefore correct that

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at 4 o'clock the first detected signs of toxicity

6

appeared that would place administration somewhere

7

between 3:30 and 5 minutes to 4?

8

A. Right.

9

Q. In that range of time?

10

A. Yes.

11

Q. Obviously these are not water-tight compartments.

12

A. Yes.

13

Q. Doctor, is administration of a

14

dose of digoxin to this child somewhere between 3:30

15

and 4 o'clock consistent in your view - administration

16

by IV bolus injection - consistent in your view with

17

the levels that were recorded in his ante mortem and

18

post mortem blood, and more particularly with his

19

having survived almost 5 hours before arresting at

20

8:45 in the morning?

A. Yes, I think it is consistent.

21

Q. In that 5 hour period one would

22

have achieved I assume steady state distribution of

23

any drug administered at 3:30 in the morning?

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A. Yes.

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Q Steady state would have been achieved probably at around 6 o'clock in the morning? Is that fair?

A. You know, that would be about the minimal time for steady state to be achieved.

Q That would be five half hours?

A. Five half hours; if you assume the alpha phase to be anywhere from 30 to 60 minutes it could be a little longer.

Q On either of those - the likelihood I take it is that steady state had been achieved prior to 8:45 when this child arrested?

A. I think so.

Q Because otherwise you could be at the extreme end of your possible range of full distribution?

A. Right.

Q If in fact steady state had been achieved at some time prior to 8:45 (that is to say there had by then been complete distribution to tissue including myocardium) I take it that thereafter an elimination cycle begins?

A. Well, the elimination cycle actually starts immediately.

Q It is carrying on while the



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distribution is going on?

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A. Right.

4

Q. Why would the ultimate effect

5

of digoxin intoxication be felt at 8:45 when the

6

child arrested on your thesis rather than at a point

7

not later in time than the achievement of complete

8

distribution?

9

A. Of course we don't know the

exact time of this complete distribution.

10

Q. No.

11

A. It could have been that in this

12

particular case the distribution was slower, was

13

delayed for some reason or another.

14

It could also be that for some reason

15

or another - this child had a normal heart structurally

16

and his myocardium was perhaps less sensitive and

17

more resistant to the effect of digoxin, and it could

18

also have been that some other factor contributed to

19

the very terminal event in the face of a high digoxin

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level in the myocardium. In other words, aggravated

the situation or so precipitated.

21

I think this is very difficult really

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to establish and I must admit that the long time

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interval is somewhat unusual for intravenous

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administration as a bolus. I don't think it is

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totally inconceivable.



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Q I have learned over the course of several months to get a little concerned when someone says that something is not totally inconceivable.

A. Right.

Q That usually means to me that anything is possible but it is not probable.

Is it probable that this child could have survived until 8:45 in the morning before arresting assuming a bolus intravenous dose of digoxin at about 3:30?

A. Certainly. I don't think there is any question that it is possible. I have seen some very --

Q Is it probable?

A. Oh, probable? Probability is - you have to relate to other things.

Q Yes.

A. In my view this is the most probable scenario.

I think, however - I cannot exclude the possibility that the drug was given orally or that the drug was given by a slow infusion.

Q Yes.

A. I think it is most probable, though, the bolus IV administration, primarily because



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of the ease of administration, the simplicity of
doing it compared to the other modes perhaps.

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Q. I must say on that particular
score I am not quite sure why a bolus administration
into the IV tube should be any more easy than
administration into the IV bag?

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A. Administration into the IV bag
carries certain risks of, you know, you can detect
it easily if somebody was looking for it. I believe
that Pacsai was the last baby to die of the four
babies with which --

12

Q. He was the second to die.

13

A. Oh, was he?

14

Q. Yes.

15

A. Oh, yes.

16

Q. Estrella in January and Pacsai
mid March.

17

18

A. Oh, yes. I think this is as far
as I can go.

19

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21

Q. Okay. I understand you. I
want to be fair and I want to be clear that I under-
stand you: you think the most probable scenario was
one of IV bolus administration?

22

23

A. Right.

24

Q. But am I right in thinking that

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even though that may be the most probably scenario
it gives rise to a degree of improbability with the
length of survival of the child?

5

A. Certainly, certainly.

6

Q. Okay.

7

A. It is by no means a typical
course of somebody who receives a bolus intravenous ...

8

9

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11

Q. Of course that was one of the
express questions asked of you by the police. Page 29
of the binder. You attempted to answer that question
back in 1981, did you not?

12

A. I don't remember.

13

14

Q. Very blunt and forthright
policemanly question if I may say so. Question No. 10:

15

"Why did it take Pacsai so long to
die?"

16

A. What page?

17

Q. Page 29 of the binder.

18

19

20

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22

Forgive me, I hope I don't do violence
to your response to that, but it seems to me that what
you then said was, well, if it wasn't renal failure
that was causing that digoxin the only explanation
for a long survival time is that it was a relatively
small overdose.

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Is that fair?

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A. There was a relatively --

Q. Relatively small overdose; an overdose but not a huge one?

A. Yes, that is certainly a possibility also.

Q. Yes. As far as the possibility of renal failure is concerned, I recognize that you have, since the time that you wrote that answer, Dr. Hastreiter, satisfied yourself there is no basis for it in the chart. I take it if there were renal failure in this child, that would explain the high potassium but it still wouldn't explain the high digoxin though, would it?

A. No.

Q. In your thesis?

A. Oh, yes, high digoxin is explained on the basis of renal failure.

Q. Oh, yes, because there is no elimination?

A. Yes.

Q. So in that case you wouldn't have to posit an administration of the drug?

A. Right.

Q. Okay.

A. But we don't have evidence of



1
J2 2 renal failure.

3 Q. We don't?

4 A. No. In fact, I think we can
5 very confidently rule it out.

6 Q. Yes. You suggested that the
7 fact that Pacsai had a structurally normal heart
8 may very well have been a factor enabling him to
9 resist for an extended period of time the effects of
10 toxicity. That at least is what I understood you
to say a few moments ago.

11 A. Right.

12 Q. On the other hand, and perhaps
13 running counter to that, does the fact that he was
14 known to have a conduction problem of some kind
15 with a history of bradyarrhythmias and of heart block
16 make him more susceptible to the effects of digoxin
toxicity?

17 A. It may or may not have been a
18 factor. In fact, it could have been the opposite. It
19 could have been that the type of arrhythmia he had
20 would make him more resistant to digoxin. In fact,
21 some types of atrial tachycardia or atrial flutter
22 fibrillation are treated with high levels of digoxin,
23 high doses of digoxin because these patients will
24 require high levels and they are very resistant to the
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drug, that is well known.

Now, the brady component of the arrhythmia, this low component makes it more likely that he would be perhaps more sensitive, but not necessarily. There is no rule that will say, yes, he would be.

Q. Dr. Hastreiter, as I understand it, you have selected what you believe to be the most probable scenario here for administration and survival time. Is that the explanation that satisfied you for Pacsai's relatively long survival after the administration of this drug at, you would estimate, 3:30 in the morning; IV bolus and a combination of factors, perhaps the structurally normal heart to some extent, perhaps the elevated potassium to some extent, and the relatively low overdose. Do those satisfy you as explaining the lengthy survival time of this child?

A. I think they can all be factors and a combination of these would be very likely the best explanation, yes.

Q. Does the length of the survival time lessen in any way, or weaken in any way your opinion that Pacsai died of digoxin toxicity resulting from an unprescribed overdose?



Hastreiter
dr.ex. (Lamek)

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A. I don't think there is any question that it makes it a less typical situation and one would have to be very, very careful in establishing the cause of death as digoxin overdose in this particular situation. However, putting everything together with the information we have, I think we have very good evidence for digoxin overdose.

Q. Perhaps you have essentially answered this question in the way that you have just answered that one, Doctor, but let me ask you and be clear anyway. Do you regard Pacsai as being as clear a case of overdose causing toxicity causing death as either Cook or Miller?

A. No. I regard Pacsai as a somewhat weaker case because of the course of events being somewhat atypical.

Q. Yes.

A. But nevertheless I still think it is a strong case.

Q. Yes. Could we go then to the last of the four children in respect of whose deaths charges were laid, and that is Janice Estrella. Janice Estrella we know had serious cardiac problems. You gave her a severity score of 8.

When in the summer of 1982 you did



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1
2 an assessment of her clinical condition, as disclosed
3 by the chart, and it is found at page 85 of the
4 binder, you rated her as having only a fair proba-
5 bility of massive digoxin overdose on the basis
6 purely of clinical conditions.

7 A. Yes:

8 Q. Now, Doctor, what in her
9 clinical picture persuaded you to give her even a
10 fair probability rating?

11 A. Well, I think first of all the
12 definition of fair probability rating is one in which
13 the index of suspicion is very low but one cannot
14 totally exclude it. The baby was obviously very,
15 very sick, had had surgery on the 16th of December
16 and never did well afterwards; had signs of terrible
17 and severe heart failure and eventually died some
18 twenty days later or so, or more I think, 25. I
19 feel that the baby's death was expected. However,
20 it probably was not expected at that particular time
21 because it happened to be a time when the baby was
22 more or less stable, considering the baby's condition
23 which was very bad.

24 However, it is a situation where I
25 think all I can say is that one cannot completely,
you know, forget it or throw it out but the index of
suspicion is very low clinically. There was not a



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Q. Clinically, there was not a great deal to excite serious suspicion of digoxin involvement?

A. Right.

Q. You did however form the opinion I take it that the child did die of digoxin toxicity caused by a large and unprescribed overdose of the drug?

A. On the basis of the toxicology.

Q. Of the total picture including the toxicology?

A. Right.

Q. And in coming to that conclusion did you rely on the post mortem level of 72 nanograms per millilitre that was recorded?

A. Yes.

Q. And you refer to that level in your reports as post mortem blood. No doubt that is what you understood it to be; let me find the reference. On page 87, for example, the last four or five lines on the page: "The abrupt terminal event which occurred on the 11th of January and the very high post mortem digoxin levels, 72 and 74 mg. per millilitre are consistent." Was that level, 72, 74, the most important piece of evidence which led



1
J7 2 you to your conclusion about this child?

3 A. Yes, definitely.

4 Q. And had that piece of evidence
5 not been available would your opinion about Janice
6 Estrella's death have been different?

7 A. Yes, I still would have a very
8 low index of suspicion, as I indicated in my clinical
9 category earlier.

10 Q. Okay. You would not have been
11 able entirely to dismiss the possibility but, as
12 you have said, the index of suspicion would have been
13 very low?

14 A. Very low.

15 Q. All right. In neither your
16 1981 nor your 1982 report, Dr. Hastreiter, do you
17 make any reference to the possibility that the 72
18 nanogram level may be suspect because of the
19 impurity of the sample in which it was measured. Were
20 you aware of the source of the sample when you wrote
21 your two reports?

22 A. I think I became aware of the
23 source of the sample at the preliminary hearing, at
24 which time the sample was said to have been obtained
25 from the abdominal cavity.

Q. Yes.



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A. And I believe it had been

thought to have been contaminated by ascitic, possibly
ascific or edema fluid or both. In my opinion at that
time this contamination with ascitic or edema fluid
should not have increased the concentration of
digoxin in blood; I thought it was blood. Now, it
was much later that I found out about this gutter
blood hypothesis which I believe was validated
eventually where it was found that gutter blood
appears to concentrate digoxin to an extent that the
concentration may be as much as 2, 3, 4, 10 times
higher occasionally, and that there was one instance
in which the level was extremely high in gutter
blood and not in heart blood.

Q. You are referring there to
what we call the gutter blood study?

A. The gutter blood study.

Q. Conducted by Mr. Cimbura in
the Pathology Department at the Hospital?

A. Right.

Now, that of course occurred
much later and I had no knowledge of it. This
occurred after the preliminary hearing.

Q. All right. Well, if I
understand you then, although you were not aware,



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indeed you could not have been aware in the summer
of '82 of the results of the gutter blood study.

A. It had not been conducted yet,
no.

Q. You were aware when you wrote
your 1982 report from what you had heard at the
preliminary hearing of the suspected contamination of
the sample?

A. Yes.

Q. Although it was a suspicion
that I understand you tended to discount?

A. Yes. I wanted to make
absolutely sure that it had not been contaminated
with the gastric or duodenal or intestinal contents;
it was contaminated with just fluid, either edema
or ascitic fluid. If it had been contaminated with
intestinal contents. Of course there could have been
digoxin added to it.

Q. Yes.

A. And it would be a totally
unreliable sample. But I thought that had been made
quite clear that it was not.

Q. When you wrote your 1981
report, having reviewed the charts of these children,
you had obviously read the chart of Janice Estrella?



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A. Yes.

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Q. Had you read the autopsy

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report which appears in that chart? I think the

5

chart is available on the table there beside you,

6

Doctor.

7

A. Yes; I believe I had.

8

Q. And in particular pages 9

9

through 12 are the final autopsy report.

10

A. Yes.

11

Q. Do you recall having seen that

12

autopsy report at the time of your first review of
this chart?

13

A. I am not totally sure but I

14

believe so, yes. I had at least seen the summary of
the autopsy report, I'm sure.

15

Q. Yes. Now, the final paragraph

16

of the narrative part of the report or the textual

17

part of the report on page 12, it is reported that:

18

"Samples of post mortem blood were

19

obtained for assay of digoxin levels.

20

These samples were contaminated

21

slightly by edema fluid and ascitic

22

fluid. The digoxin levels in these

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samples measured 72 nanograms,

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toxic levels... and so on.

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This level is



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markedly elevated over the normal
therapeutic range and if accurate
would explain the death of the
patient."

Now, I take it then, Dr. Hastreiter,
that you were probably aware of that caveat raised in
the autopsy report at the time you delivered your
initial report at the end of May 1981?

A. I am not one hundred per cent
sure of that.

Q. All right.

A. You know, I don't believe that
I had read the text here. I had, I believe that I
had just the summary and the chart at the time but
I cannot be completely sure about that.

Q. Well, if you cannot be sure
that you read it at the time, I certainly can't
fix you with knowledge of it. However, we will
leave that.



K/DM/ak

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2 I gather from what you have told us
3 that you are now aware, Dr. Hastreiter, that the
4 gutter blood study at least indicated a measure of
5 elevation in gutter blood over heart or sagittal
6 sinus blood, and in one case a very, very marked
7 elevation of a level recorded of 169 nanograms in a
8 child whose heart sample was not noticeably elevated;
9 you are aware of that now?

10 A. Yes.

11 Q. In light of that, do you now
12 believe that you can properly and confidently rely
13 upon the 72 nanogram level as a basis for an opinion
14 that Janice Estrella died of digoxin intoxication
15 resulting from an overdose?

16 A. I think it has weakened the
17 case considerably and I don't believe that one can
18 rely on this sample very strongly. I don't think
19 one should completely eliminate it, but the index of
20 suspicion became much lower now.

21 Q. Are you suggesting that your
22 index of suspicion may not be reduced entirely to
23 the level that it would be on the basis of the
24 clinical picture alone, but probably not very much
25 above that?

A. Right, I would say so.



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Q. Now, we do know however, and this is at page 6 of Exhibit 95, the Cimbura report, that concentrations measured in fixed heart tissue were of 4 nanograms of digoxin per gram. Now again, I assume it is impossible to make any kind of quantitative estimate of the amount of digoxin that may have been in fresh heart tissue; but in light of the fact that this child had received prescribed doses of this drug until five days before her death, do those low concentrations measured in fixed heart tissue enable you to treat this death as anything more than merely suspicious?

A. No. This is more or less the type of, the range of magnitude that I would expect in a therapeutically treated child whose heart had been kept in this solution for five months.

Q. Now there is one aspect of this case that I confess I am puzzled by, Dr. Hastreiter, and I am puzzled by the views you have expressed about it. It concerns the elevated serum digoxin levels on January the 7th and on the three or four days thereafter.

You are aware of course, and you refer to it in your reports, that on January the 7th this child was found to have an elevated serum



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digoxin level reported in the chart as greater than 5 nanograms per millilitre.

A. Right.

Q. The evidence here from the digoxin books maintained in the Biochemistry Department has been that that level was indeed greater than 9.4 nanograms.

A. Right.

Q. On January the 8th, the level was recorded as greater than 4.7, and we know that that level was 7.8, and then on January the 9th the level is reported as 4.7 nanograms.

Now, I understand that you did not learn the actual levels on January the 7th and 8th until you gave evidence at the Nelles Preliminary Inquiry, is that correct?

A. Yes, that is right.

Q. Until then you did not know that the numbers were any more precise than-greater than 5 or greater than 4.7.

A. Right.

Q. Now, in your first report on Estrella, Dr. Hastreiter, and it is found at page 15 of the binder, you appear to have been of the view that the elevated digoxin levels on January 7th, 8th



1
2 and 9th were probably caused or contributable to
3 pre-renal failure. In the last full paragraph on the
4 page, beginning three lines in, you report:

5 "The much higher ante mortem plasma
6 digoxin concentrations observed from
7 7/1/81 through 9/1/81, despite the
8 fact that the maintenance dose of
9 the drug had not been changed, they
10 reflect pre-renal failure associated
11 with cardiac decompensation and a low
12 cardiac output, possibly true renal
13 failure (the laboratory findings,
14 serum creatinine, BUN, serum potassium,
15 et cetera should clarify this) or
16 possibly an overdose of digoxin. The
17 latter hypothesis is not very likely
18 at this early stage and the occurrence
19 of pre-renal failure appears to be a
20 more suitable explanation."

21 So essentially you canvass three possible explanations.
22 One, true renal failure, and as to that you wanted
23 to get the laboratory information; two, pre-renal
24 failure; and three, possibly an overdose of digoxin.
25 Of the three at that time you seemed to have thought
the most likely explanation was pre-renal failure.



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Q. Before we go any further,
Doctor, I have nodded my head wisely every time
everyone said pre-renal failure of the last six
months, what is pre-renal failure please?

A. Pre-renal failure is the
situation where the kidney is not excreting the
substances in the blood, not because it is damaged
or deficient, but because the blood supply to the
kidney is interfered with in some way, so that it is
not adequate and does not permit the substances that
the kidney is supposed to filter to reach the kidney.

For instance, if you have severe heart
failure, it would be a good example, where the heart
failure may be so severe that the cardiac output is
diminished and the blood supply, or the output to
the kidney is also diminished. Or if you have
peripheral shock for some reason; infection of
blood dose or something like this, also the blood
flow to the kidney will be reduced to the extent where
there is no filtration of the substances.

Q. So true renal failure, consists
of some inability of the kidney itself?

A. Right.

Q. To eliminate waste product.
Pre-renal failure is not something that occurs before



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renal failure, it is a failure that occurs before you reach the kidney?

A. Before you reach the kidney, exactly.

Q. All right. Okay, so at that stage back in late May, 1981 you thought the most likely explanation for the elevated digoxin level on January 7th and 8th was pre-renal failure.

Now, at the preliminary inquiry you learned what the actual levels had been on January 7th and 8th, and upon acquiring that information you gave some evidence which interests me. It is found in Volume 34, Page 37, beginning at Line 11 and going on to Page 38. You were asked at Line 11 in cross-examination by Mr. Cooper:

"Q. Are you going to stick to your original indication that these levels in Janice Estrella during January 7th, 8th and 9th were probably due to pre-renal failure on the part of that child?"

And he had not told you what the actual levels were.

"A. I still would say that the possibility of an overdose of digoxin exists but I cannot be sure about it.



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I think the level of higher than 10 would make me very suspicious. It would be unusual, very unlikely to find a level higher than 10 in pre-renal failure."

Now, let's pause there. A level higher than 10 had come about, as I understand it, because you had extrapolated back on the declining levels on which you were now aware and determined that greater than 9.4 almost certainly meant greater than 10 itself, is that right?

A. That is correct.

Q. And you said:

"A. It will be very unusual, very unlikely to find a level higher than 10 in pre-renal failure."

And then you were asked where that level comes from and you tell him. The question at Line 25:

"Q. I am going to suggest to you you did give an opinion that these levels were all probably due to pre-renal failure, did you not?

A. Yes, that was before I had Dr. Ellis' evidence as to the actual levels.



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Q. All right. I think you said it was the reading of 9.4, as I recall your evidence, I have a note of it.

A. More than 9.4.

Q. More than 9.4 that led you perhaps to be a little concerned about your original opinion, is that right?

A. That and extrapolating back from the 4.7 and 7.8 which I believe were accurate measurements.

Q. Well, then, are you now prepared to concede that those levels are consistent with pre-renal failure in Janice Estrella?

A. No, I am not.

Q. You are not, you have changed your opinion?

A. I am considering the possibility of an overdose in the light of new evidence which I did not have before.

Q. And that new evidence again is?

A. The 7.8 on the 8th, this level had been previously reported as more than 4.7 and it was eventually I believe established as being 7.8.



1
2 Having two good levels, one can
3 confidently extrapolate back to the
4 previous day, and although I don't have
5 that level confirmed..."

6 You told him it was being crossed out.

7 "...I think the probabilities again,
8 the scientific probability would be
9 that it was higher than 10, but that
would be in direct evidence."

10 Now, if I understood you correctly at that point,
11 you were saying, if the reading on January the 7th
12 were greater than 10 that would be sufficiently un-
13 usual as being indicative of pre-renal failure, that
14 your opinion of pre-renal explanation would be
15 considerably weakened; did I understand you cor-
rectly in that evidence?

16 A. Yes. I feel that the level
17 of around 10 or higher than 10 is rather unlikely to
18 occur in pre-renal failure, and that the other
19 possibility of digoxin overdose should be entertained.

20 However, by no means is it impossible
21 to have a level of this magnitude in renal or pre-
22 renal failure, especially in a small baby. Babies
23 are more resistant to digoxin than older persons in
24 general.
25



1
2 Q. Yes. Could I perhaps refer
3 you, Dr. Hastreiter, to what you said further in
4 cross-examination, beginning at Line 17 of Page 39
5 of Volume 34. You were asked:

6 "Are you aware in the early morning,
7 the early morning of January 7th at
8 a time when you extrapolate
9 Janice Estrella might have had a
10 blood level as high as 10 nanograms
11 that Baby Estrella arrested?

12 A. Yes.

13 Q. Went into arrest and her heart
14 rate went way down.

15 A. Yes.

16 Q. Bradycardia?

17 A. Yes.

18 Q. That was about 6:00 in the
19 morning of January 7th, is that correct?

20 A. Yes.

21 Q. Then resuscitation efforts
22 were attempted and the baby was able
23 to be resuscitated, is that correct?

24 A. Yes.

25 Q. There seems to be evidence that
Dr. Runge thought that the baby might



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have been dig. toxic, so apparently
dig. toxic at the time of that arrest,
are you aware of that?

A. Yes.

Q. Right. So I am going to sug-
gest to you during the night of January
6th and early morning of January 7th
it is likely that Baby Estrella re-
ceived too much digoxin that put her
into the situation where she arrested
at 6:00 in the morning on the 7th, is
that correct?

A. Yes."

Now, do I understand from that evidence, Doctor,
that you were inclined in light of the January 7th
level of greater than 10, or extrapolated level of
greater than 10, and the arrest that occurred, that
you were inclined to believe that an overdose of
digoxin was the then more probable cause of the
elevated levels on the 7th and 8th?

A. I'm not sure that I can say
that it was the more probable cause. I think it
was a significant -- the probability was significant.

You know, if a child has renal or
pre-renal failure, a therapeutic dose could raise the



1
2 level in the blood to a point where the child becomes
3 toxic and could develop a cardiac arrest, could
4 develop the same symptoms. So I just think it should
5 be taken into consideration, quite strongly, the
6 possibility of an overdose.

7 Q. When we come to your report
8 in the summer of 1982, perhaps you can refer to
9 Page 85 of the binder. Going past the two pages
10 of form and coming to Page 87.

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Page 87 appears to me to be a copy
of the page from your May 1981 report.

A. Yes.

Q. Page 15 in this binder?

A. Yes.

Q. But page 88 is new. This hadn't
appeared in the earlier 1981 report. In the middle
of page 88, referring to the elevated digoxin levels
on the 7th, 8th and 9th, you said:

"The relatively high ante mortem
plasma digoxin concentrations
observed on 7/1/81 through 9/1/81
are probably associated with pre-
renal failure associated with
congestive heart failure and a low
cardiac output. True renal failure
can be excluded because the BUN
examinations were within normal
limits except on 7/1/81 when they
ranged from 31 to 32 nanograms."

And then at the very bottom of the page in the last
paragraph:

"Although further dilutions were
not obtained on the serum specimens
of 7/1 through 9/1/81 which revealed



L.2

1
2 "concentrations of digoxin ranging
3 from 4.7 nanograms per millilitre
4 to higher than 5 nanograms, there
5 appears to be still a great
6 discrepancy between these levels
7 and the extremely high post mortem
8 blood digoxin concentrations of 70
9 and 74 nanograms. When considering
10 a marked effect of hemolysis on the
11 high post mortem blood levels, e.g.,
12 assuming that the true pre mortem
13 concentration at the time of death
14 was 2.5 or 3 times lower, or 25 to
15 30 nanograms, the latter concentration
16 is still too high to be able to be
17 tolerated for more than a few hours.
18 Let us say a maximum of 24 hours,
19 without inducing a fatal disruption
20 of the heart rhythm and death. For
21 this reason I believe it to be unlikely
22 that the pre mortem blood levels of
23 digoxin observed on 7/1/81 through
24 9/1/81 are due to an overdose of the
25 drug."

And do I take it, Dr. Hastreiter,



L.3

1
2 that was - and at the top of the next page:

3 "As indicated above, it is much more
4 likely related to so-called pre-renal
5 failure associated with severe
6 cardiac failure."

7 Do I take it, Dr. Hastreiter, that
8 that was your matured and ripened ultimate opinion
9 as to the probable cause of the elevated digoxin on
the 7th and 8th of January?

10 A. Yes, but this was written when?

11 Q. I had understood this was part
12 of your 1982 report.

13 A. Because I --

14 Q. I am puzzled that it doesn't
15 give the actual readings?

16 A. Yes, I am too.

17 Q. Yes.

18 A. I am surprised. I had later
19 placed more weight on the possibility of overdose
20 of digoxin which I didn't at this time. And I should
have had the readings here, the exact readings.

21 Q. I was a little surprised that
22 they were not there, but it may be, Doctor, that this
23 is one of those shuffles that has gone on with all
24 these documents, and this may be part of your update report
25



L.4

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from September, 1981?

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A. That is what I think.

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Q. So let's avoid all that. Let

me ask you what is today your best judgment as to the most probable cause of the elevated digoxin levels in Janice Estrella on January 7 and 8?

A. I think in my opinion the best diagnosis would be one of pre-renal failure still. I would entertain, however, the possibility of overdose at that particular time.

Q. One last question if I may about Janice Estrella by way of a wrap-up question:

Doctor, in light of all that that you now know about Janice Estrella, and I should tell you now on the record as I have previously told you privately - I am sorry, forget about that one. That is a different question.

In light of what you now know about this baby, including your knowledge as to her clinical condition, her actual serum digoxin levels, January 7, 8 and 9, the source, manner of collection and possible contamination of the sample in which a level of 72 nanograms was recorded and the results of the gutter blood study, do you have an opinion today as to, first, the probable cause of that elevated serum,



L.5

1
2 and you have told me that is pre-renal failure on
3 January 7 and 8; second, the probable cause of the
4 child's death.

5 What probably in your best judgment
6 caused this child's death?

7 A. May I first say a word about
8 the gutter blood again?

9 Q. Yes, of course.

10 A. I am a little bit concerned
11 about the fact that we only have one specimen of
12 gutter blood that has really a very high level. A
13 level above 100. All the others have levels which
14 are below 15 I believe or certainly below 20, and
15 are comparable - at least not very far from the levels
16 of the heart blood.

17 So this concerns me a little bit, and
18 I believe that further research really will be
19 necessary to validate the fact that this gutter blood
20 can be so out of proportion with the heart blood as
21 far as the content of digoxin is concerned.

22 However, I do feel that the value of
23 this sample has been reduced significantly, and in
24 my opinion as I said earlier, this child had good
25 medical reasons to die, and the blood level was really
our major evidence for digoxin toxicity, so my present



L.6

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opinion will be that I would have a very low index
of suspicion still of the possibility of an overdose.
I would not completely eliminate this hypothesis,
but I would feel that most likely death was caused
by her original disease.

7

MR. LAMEK: Doctor, thank you. Those
are my questions about Janice Estrella.

8

9

We have come to the end at a very
opportune time I think, Mr. Commissioner.

10

11

THE COMMISSIONER: Yes. All right.
We will rise until 2:30 then.

12

--- Luncheon adjournment.

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AA
EMT/cr

---On resuming at 2:30 p.m.

THE COMMISSIONER: Yes, Mr. Lamek?

MR. LAMEK: Q. Dr. Hastreiter, I said we had finished with the four children in respect of whose deaths charges were laid in March of 1981.

There is just one matter, though, that I would like to go back to with respect to Kevin Pacsai.

You have told us that your last involvement with these matters, that is your attendance at the meeting in September when the various deaths were classified and categorized ---

A. Right.

Q. - and that was on September 13th.

Under date of September 29th Mr. Cimbura at the Centre for Forensic Sciences delivered a further report (It is Exhibit 95E, Mr. Commissioner, and should be part of the bundle which I believe you have, Doctor) reporting on certain exhumed tissues and digoxin assays performed on those tissues. Included in that report on page 5 there is reference to what appears to be a fresh autopsy tissue sample from Kevin Pacsai.



1
2 Half way down the page is the
3 statement:

4 "The following specimens are reported
5 to be autopsy tissues kept frozen
6 at the Hospital for Sick Children
7 since the respective autopsies."

8 And Sample T-104 is said to be:

9 "Sample of tissue in foil marked
10 'A74-81 lung'. In a plastic bag
11 bearing Seal No. 1D05840. Reported
12 to be from Kevin Pacsai."

13 And the report is:

14 "The tissue was found to contain
15 122 nanograms per gram of digoxin."

16 And we have heard from Mr. Cimbura that was his
17 way of indicating by his report that the number
18 reported, the level reported, was one arrived at
19 by RIA after HPLC. Indeed his normal practice is
20 to do an RIA first and then run the sample through
21 HPLC and then take the extracted sample from that
22 and do the RIA again.

23 So we may take it the 192 nanograms is the
24 concentration in the tissue of digoxin as identified
25 by HPLC and RIA.

Were you aware of that piece of



1
2 toxicological information, Dr. Hastreiter?

3 A. I don't remember, no.

4 Q. Does the level in that sample,
5 if indeed it be fresh autopsy tissue from Kevin
6 Pacsai, give you any greater degree of confidence
7 in your view as to the probable involvement of
8 digoxin in the death of that child?

9 A. Give me a minute and let me
10 check my tables here for a second.

11 Q. Yes, of course.

12 A. The level of the concentration
13 of digoxin in the lung is certainly higher than one
14 would expect with therapeutic administration at this
15 age.

16 However, I think lung tissue is not
17 accepted by some of the experts as a very good
18 marker for digoxin toxicity because of the extreme
19 variability that it may show.

20 Q. You will notice, Dr.
21 Hastreiter, that Mr. Cimbura's notes following
22 that report are three in number. The second says:

23 "The digoxin concentration in the lung
24 tissue is by itself inconclusive with
25 respect to digoxin toxicity."

You would agree with that?



1
2 A. I would agree with that that
3 it is inconclusive by itself, but it is in my opinion
4 a supportive piece of evidence that an overdose
5 has taken place.

6 Q. Thank you.

7 We have now, Dr. Hastreiter, reviewed
8 the four children whose death were the subject
9 matter of the charges in 1981, and I propose now to
10 move to certain other children, and so that you may
11 know where I am going and gauge from time to time
12 how close to the end of this. I tell you I want
13 to discuss with you the cases of Kristin Inwood,
14 Jordan Hines, Stephanie Lombardo and Jesse Belanger,
15 and the latter three of those four because, of
16 course, they were children for whom digoxin was
17 not prescribed, but in whose tissues it was found:
18 Kristin Inwood for reasons that are clear; there
19 is a startlingly high digoxin concentration found
20 in the samples said to be serum of that child,
21 and I wanted to go to a group of children whom on
22 the basis of their clinical conditions and courses
23 you concluded that there was a good or fair
24 probability of massive digoxin overdose.

25 I propose to ask briefly about each
of those of whom you said there was a good



1
2 probability, and then probably ask you in a group
3 about those of whom you said there was merely a
4 fair probability. Then I want to ask about the
5 more recent case of Gary Murphy.

6 Can we go then to Kristin Inwood,
7 please?

8 By way of summary, Dr. Hastreiter,
9 perhaps I can remind you that you gave this child
10 a severity score of 6 in respect of her cardiac
11 problems, and I take it you did not consider her
12 heart lesion to be too severe.

13 The initial report is contained on
14 page 19 of the binder - I am sorry, it is not 19.
15 Page 80 at the bottom.

16 A. Okay.

17 Q. Are we together on it?

18 A. Yes.

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Q. In that initial report, Dr.

Hastreiter, on Page 18 of the binder there is a brief report
and you summarize the clinical picture and course,
the circumstances of the arrest, the serum digoxin
concentration obtained the day prior to her death
and you conclude in your comment,

"This is another good possibility of
digoxin overdose, since the terminal
episode and death were quite unexpected."

And you go on to record the presence of Ms. Nelles.

A. Yes.

Q. Now, other than the observa-
tion that the terminal episode and death were un-
expected, or quite unexpected, was there any other
basis for your concluding that Kristin Inwood was
another good possibility of digoxin overdose?

A. According to my notes, the
baby was about 20 days old or so and had a coarcta-
tion of the aorta and aortic stenosis but it
appeared to be relatively mild; the aortic stenosis,
that is.

Q. Yes.

A. The baby had symptoms, she
was tachypneac, that is, breathing fast, feeding
poorly and I believe that she was scheduled for a



1
2 procedure, I'm not sure now -- anyway, the
3 terminal episode which occurred on 13/3, that is,
4 two days after her admission to the hospital, was
5 unexpected and abrupt. She had a short burst of
6 tachycardia with a rate of about 200 per minute which
7 resolved spontaneously. This was followed by an
8 episode of bradycardia and cardiarepiratory
9 arrest and this occurred, the arrest -- no, the first
10 bradycardia occurred at 2:00 and the arrest at 2:30
and she was pronounced dead at 3:00.

11 I believe on the basis of the un-
12 expectedness of this terminal event and the abruptness
13 of the event, I felt that digoxin toxicity was a good
possibility here.

14 Q. Apart from the unexpectedness
15 and the abruptness of the terminal event, Doctor, did
16 the nature of the terminal event play any part in
17 your assessment, the tachycardia, bradycardia and
18 so on?

19 A. Well, as I mentioned several
20 times before, this is sometimes difficult to interpret
21 because first of all digoxin does not necessarily
have specific symptoms.

22 Q. Yes.

23 A. And many of these symptoms such
24
25



1
2 as tachypnea, bradycardia, tachycardia can be re-
3 lated to many other causes. I think the combination
4 of the fact that the type of heart disease was such
5 that she was not expected to die at that time. As
6 I said, the unexpectedness, abruptness, the type of
7 symptoms and also the fact that at autopsy there was
8 no clear reason for death defined and there was
9 focal myocardial necrosis described presumably on a
10 hypoxic or ischemic basis and it was thought that
11 this may have been the reason for the electrical
instability and the arrhythmia.

12 Oh, this baby also had what appeared
13 to be an amniotic fluid aspiration.

14 Q. Yes.

15 A. And she had rather extensive
16 involvement of the lungs from this process. However,
17 it appeared to be in a state of resolution. It was
18 not something acute that had just happened. Of course,
19 the baby was already about three weeks old at the
20 time. So, on clinical grounds I classified her as
a good probability of digoxin overdose.

21 Q. And something over a year
22 later, Dr. Hastreiter, when you came to review this
23 child again and that report is found at Page 165 of
24
25



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the binder.

3

A. Yes.

4

Q. You rated as good on a clinical

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basis the probability of massive digoxin overdose,

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and I take it on the same basis as you have just

7

described for your conclusion in May of 1981.

8

A. Right.

9

Q. Okay. Now, in your 1982 review

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I do not see a reference to the toxicological data

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which were by then available and, in particular,

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to the serum level. You had referred to those data

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in your preliminary inquiry evidence, Volume 64

14

beginning at Page 12 and, in particular, beginning

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at Line 27 on Page 12. You had been asked this

16

question:

"Q. Dealing with Baby Kristin

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Inwood, unlike the other babies that

18

I mentioned, in that particular case

19

that there apparently was a blood

20

sample available that was tested by

21

a Mr. Cimbura and having looked at that

22

blood sample and the result obtained

23

with respect to the digoxin in it

24

and the other levels that you reported

25

in the tissues of the baby's body, what



1
2 is your opinion concerning the death
3 of Kristin Inwood?"

4 To which you answered,

5 "A. I don't think there is any
6 question that unless a terrible error
7 was made in this determination or an
8 artefact occurred that a serum level
9 of 491 nanograms per millilitre would
10 be a massive dose that the baby had re-
11 ceived and that caused the baby's
12 death. It is the highest dose ever
13 described for anybody receiving digoxin,
14 the highest blood concentration, and I
15 would go so far as to say that
16 most likely this would have had to have
17 been administered intravenously in
18 order for such a high level to be
19 achieved. I don't see how any other way
20 could do it.

21 Mr. Cimbura testified the other day,
22 he indicated, I believe, that he agrees
23 with my views but also probably the
24 baby died shortly after the administra-
25 tion of the drug and there wasn't enough
time for distribution to occur. In other



1
2 words, the drug was given here..."

3 Presumably pointing to a chart or a schedule or
4 graph.

5 "...and the baby died still during
6 this high phase of the curve here,
7 rather than having given it enough time
8 to come down and settle at a plateau.

9 This may be one of the reasons
10 then why the level was so extremely
11 high because it is almost an incon-
12 ceivable level. The baby could not
13 have lived with such a level, very high.

14 Now, the myocardium level is
15 also the highest that we have in this
16 series from Mr. Cimbura and I think it
17 fits the other data, it matches the
18 blood level quite nicely. Of course,
19 I think one has to be careful with
20 interpretation of these fixed heart
21 specimens. Heart specimens which were
22 fixed with the formalin, so-called
23 Klotz solution, however, the trend
24 would be for the levels to come down,
25 the tissue concentrations to be less
than they were in the fresh specimen.



1
2 So, if we get a reading here of 337
3 or 323 this is probably much higher
4 than the fresh specimen, how much I
5 don't know, it is very difficult to
6 say."

7 But it is perfectly plain, Dr. Hastreiter, that in
8 the course of giving your evidence at the preliminary
9 inquiry about this child the toxicological informa-
10 tion which Mr. Cimbura had produced was clearly very
11 significant to your mind, was it not?

12 A. Yes.

13 Q. But I'm puzzled that when you
14 come to a further review of this child in 1982,
15 following the preliminary inquiry, there is no
16 reference to the toxicological information. Is
17 there any particular reason for that, were you avoid-
18 ing it for some purpose?

19 A. No, I'm not avoiding it. I'm
20 not sure. You say that the information was available
21 at the time?

22 Q. Well, you referred to it in
23 the preliminary inquiry.

24 A. At the preliminary hearing.

25 Q. This review, as I understand
it, was done after the preliminary.



1
2 THE COMMISSIONER: Before we leave that,
3 are we certain of the date upon which it was done?

4 MR. LAMEK: I had understood that this
5 form was the one that had been designed for the
6 second review.

7 THE WITNESS: Yes, following the pre-
8 liminary hearings.

9 MR. LAMEK: Yes.

10 THE WITNESS: There is no question
11 about it, yes.

12 THE COMMISSIONER: Well, would this
13 be the one that was referred to in the September
14 meeting?

15 MR. LAMEK: I'm sorry, Mr. Commissioner?

16 THE COMMISSIONER: Would these be the
17 reports that were referred to in the September
18 meeting?

19 MR. LAMEK: Well, perhaps we could
20 ask Dr. Hastreiter that. At the September 13th
21 meeting, Doctor, did you have these documents
22 before you or some other notes, I don't know.

23 A. Yes, these documents for the
24 clinical information.

25 Q. Yes.

A. And I think in answer to your



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question ---

THE COMMISSIONER: Do you remember, Inwood was the one with the two votes.

MR. LAMEK: Yes. I will be coming to that certainly in the course of this discussion.

THE COMMISSIONER: All right, thank you.

THE WITNESS: I think in answer to your question this second review was done, my function for the second review was really to gather clinical information. It was not, as you see from the final item here, the classification of these babies into one of the three categories, this is purely on clinical grounds and I don't believe that I made an effort there to obtain the toxicological data at all because the purpose was to categorize them on clinical grounds.

Q. I understand, Doctor. It was merely my recollection, which may be faulty, that in other cases there had been an update of the textual material in the report to include toxicological information which had not earlier been available.

A. Well, the final inclusion of the toxicologic information was done at the meeting in September.



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2

Q. Okay.

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A. With the toxicologists and

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the coroners present.

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Q. All right. Well, certainly

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when you were involved in the discussion of the

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toxicologic information, that is to say, at the

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preliminary hearing, you went on to calculate the

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dose which would have produced the recorded concentra-

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tions and you estimated that the dose would be 10.

milligrams. Do you recall that?

11

A. Again, assuming a steady state.

12

Q. A steady state of distribution?

13

A. Yes.

14

Q. In other words, some 20 adult

ampules or, horrid thought, 200 pediatric ampules.

15

Now, a couple of questions, please,

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with respect to that evidence. In the passage of

17

your evidence which I read to you, Doctor, you had

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said this, it is one short sentence:

19

"When Mr. Cimbura testified the other

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day he indicated I believe that he

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agrees with my views, but also that

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probably the baby died shortly after

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the administration of the drug and

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there wasn't enough time for

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distribution to occur."

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Do you agree with Mr. Cimbura in that regard, that death probably followed shortly after administration without there being a time for distribution to occur?

5

6

A. Yes, I do.

7

Q. Do you share that view?

8

A. Yes.

9

Q. Do you mean by that that

10

death ensued so quickly after administration that virtually no distribution occurred or do you mean that less than complete distribution occurred?

11

12

A. Less than complete distribution.

13

Q. All right.

14

A. I don't think there is any

15

situation where no distribution at all occurs.

16

In theory this can happen but in practice it doesn't.

17

18

Q. Now, in Exhibit 95-A at Pages

19

728 of the Cimbura reports we do have the reports of the assays done by the Centre of Forensic Sciences on fixed tissues of this child. Left ventricle, concentration of digoxin at 230 nanograms per gram, left atrium of digoxin, 79 nanograms per gram, the septum, 300 nanograms of digoxin per gram. Do

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1
2 you attach any significance to those digoxin concentra-
3 tions reported in fixed heart tissue?

4 A. In this particular case, yes,
5 because the levels are extremely high. This is a
6 child that had died several months earlier. The
7 specimens had been fixed for a three month period
8 and, as I indicated earlier, the average levels of
9 digoxin in myocardium at this point, expected
10 levels would be below 10 or 15. Here we are dealing
11 with levels of up to 300 in left ventricle. I think
12 this is very significant and fits the blood level
13 data.

14 Q. Okay. Again, so that I under-
15 stand you, I take it you cannot estimate with any
16 measure of confidence what the fresh tissue
17 concentration would have been, but your suggestion
18 is that the level in the fixed tissues are so un-
19 usually high that you attach some corroborative
20 value to them.

21 A. Yes.
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Q. Is that right?

A. I would attach a great deal of value to them in this particular instance.

THE COMMISSIONER: Mr. Lamek slid in a little preparatory phrase at the beginning and I would just like to make sure you agree with that too. He said that you could not rely upon the readings in the fixed tissue. You will note if you look at page 8 of Mr. Cimbura's report, he estimates a concentration of digoxin in the heart was fixed and was not less than 545 nanograms per gram; what do you say about that? Do you think that you can do such a thing?

THE WITNESS: I think you can make a minimum estimate like Mr. Cimbura was doing, and I think this is quite appropriate. Because what he was doing is he was simply taking the digoxin that was in the heart and then adding to it the digoxin that was found in the fluid, and I think basically something like this. There is a little more to it than that because it doesn't add exactly to that number.

THE COMMISSIONER: He assumed it was 31 nanograms in the heart?

THE WITNESS: Yes.

THE COMMISSIONER: In the heart?



1
2 THE WITNESS: Yes. It was, I remember
3 we talked about it several times and it was a very
4 conservative estimate. Mr. Cimbura in general,
5 I always thought that his conclusions were very
6 conservative, and he always made very clear that
7 unless there was enough information he would not
8 commit himself at all. In some of these cases he
9 decided to make an estimate of the minimal amount
10 that was supposed to be there.

11 MR. LAMEK: Q. I think he described
12 that process for us when he was here, Dr. Hastreiter.
13 As I recall it essentially it was that he knew what
14 concentration was present in the heart tissue because
15 he assayed that and measured it. He knew what
16 concentration was present in the fluid because he
17 knew that and he had measured it. He therefore
18 calculated the total amount of digoxin in the
19 surrounding fluid and attributed that to the heart.
20 He knew the weight of the heart tissues that he
21 had there and attributed a concentration to each
22 gram of heart tissue on a straight division basis.
23 Then of course multiplied his total concentration
24 program by the number of grams to get a minimum
25 concentration in the heart?

A. I think so, what we have here



1
2 is the concentration in the Klotz solution but
3 we don't have the volume.

4 Q. That's right, but he knew
5 the volume.

6 A. He knew the volume so he
7 could figure out the total amount of digoxin in
8 the fluid and he added to that to the solution
9 in the heart.

10 Since digoxin is not produced it can
11 be broken down but it cannot be produced, I think
12 it is a valid way of establishing the minimum
13 value, but it is a minimum value and it is very
14 difficult to say how much above the true value
15 would have been.

16 Q. With respect to your
17 calculation of the dose of 10 milligrams Dr.
18 Hastreiter, you confirmed again that calculation
19 assumed steady state of 491 nanograms?

20 A. Right.

21 Q. And I take it that that
22 could not in all conscience have been steady state
23 of distribution?

24 A. Right.

25 Q. And indeed the assumption
that you and Mr. Cimbura made was that death



1
2 followed shortly after the administration of a dose
3 of this size?

4 A. Right.

5 THE COMMISSIONER: But if there is
6 a heavy concentration in the tissue, would that
7 not indicate that it was well on the way to a
8 steady state?

9 THE WITNESS: That is right. It
10 is a little difficult to conciliate these two
11 findings. One where you have such an enormous
12 level in the blood that would not permit the person
13 to live very long with that particular level; and
14 yet you have also a high concentration tissue, which
15 would indicate that a certain amount of time had
16 passed between the time of administration and the
17 analysis. So it is not an easy situation, every-
18 thing indicates that a very large dose was given.
19 At what point exactly, you know, I am not sure, it
20 could be - I would take sort of an intermediate
21 position and I would say there must have been
22 enough time for digoxin to accumulate in tissues
23 to a very high level, and yet the level was also
24 very high in the blood, so anywhere from an hour
25 and a half to two and a half hours would be my
estimate.



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Q. Now we know, Doctor, that digoxin had been prescribed for this child, and had there been any administration of digoxin I take it that would have resulted in some accumulation in heart from the normal regimen of therapeutic administration?

A. Yes. The highest level of digoxin in heart that would be expected from therapeutic administration would be around 400.

Q. Yes.

A. Or tops would be 450 at the most.

Q. And so even if one assumes here a very substantial and unprescribed overdose of digoxin, as I assume you do, that dose is not starting with a clean slate as it were in the heart, there will be a deposit of digoxin already in the heart from the former therapeutic doses I take it?

A. Right.

Q. Which rather reduces the amount of additional distribution that has to occur?

A. Yes, that is a complicating factor also, it makes it a little more difficult



Hastreiter, dr.ex.
(Lamek)

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2 to interpret the additional digoxin in myocardial.

3 Q. What is your best judgment,
4 Doctor, as to the time that probably elapsed between
5 administration and death here?

6 A. I indicated just a few
7 minutes ago that I thought it was an hour and a
8 half to two hours would be my estimate. Perhaps I
9 should shorten that a little bit, because I was
10 not thinking about the fact that Kristin had received
11 digoxin therapeutically, and that may be a very
12 important factor as far as building the myocardial
13 level, and the myocardial level could have been
14 400 or more to begin with, perhaps a little over
15 400, and the added amount of digoxin, we don't
16 know.

17 Q. We don't know how much
18 additional?

19 A. We don't know how much it
20 is. There must have been some time for distribution
21 because there is some additional digoxin in myocardial.

22 Q. On the basis - I confess I
23 was even puzzled by your one and a half to two and
24 a half hours before you recalled the prior
25 therapeutic administrations, Doctor.

A. Yes.



1
2 Q. Because after all we talked
3 of Cook this morning and yesterday in proposing
4 a dose one hour before death, there was a child
5 whose heart presumably was a clean slate as far
6 as digoxin was concerned, but distribution of
7 almost 1200 nanograms per gram. I am not sure
8 why in this case you would posit a very much
9 longer interval between the two, especially since
10 you are also proposing a very much higher dose
11 of the drug in the first place. Is there some
12 inconsistency between your views as on Cook and as
13 on Inwood?

13 A. Well I think that Inwood
14 obviously, judging from the blood level alone
15 you would make it a very short time. Judging
16 from the tissue concentration levels my feeling
17 would be that this tissue concentration would be,
18 if it is 380 in left ventricle in a fixed specimen,
19 it probably would be 2000 or some in the unfixed,
20 in the fresh specimen that would be my feeling,
21 but I really have no way of knowing this so these
22 are all estimates. This is the best I can do with
23 data which are not very clean.

24 THE COMMISSIONER: Yes, Mr. Olah?

25 MR. OLAH: It would assist us possibly



1
2 if my friend would ask the Doctor who commenced
3 to answer about moving of the time or changing
4 the time. He said it was some one and a half to
5 two and a half hours but he would have to re-
6 calculate given the therapeutic dose and I would
7 like to have the Doctor's most recent and freshest
8 opinion on that.

9 THE COMMISSIONER: I think we will
10 get that, I think we will get that.

11 MR. LAMEK: Q. If, Dr. Hastreiter,
12 this child did die, let us say an hour and a half
13 after administration of the dose, and in the range
14 that you gave of one and a half to two hours, two
15 and a half hours, do you have any judgment as to
16 which is the more likely extreme?

17 THE COMMISSIONER: I think one and a
18 half hours I think he went on to say or less.

19 MR. LAMEK: Yes.

20 THE COMMISSIONER: I think one and
21 a half is closer is it not?

22 THE WITNESS: Right.

23 THE COMMISSIONER: Have I read your
24 mind?

25 THE WITNESS: Yes I would probably
actually move it down a little from one to two



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2 hours, because I was not thinking about the fact
3 that there was already digoxin in the myocardial.

4 THE COMMISSIONER: There is another
5 thing too, is this not the child with the missed
6 dose too, wasn't it Inwood that got ---

7 MR. LAMEK: She got someone else's
8 dose and that is why it was held a couple of days
9 before her death.

10 MR. LAMEK: Q. Let's assume, Doctor,
11 death an hour and a half after administration, which
12 is now the mid point of your new reading one to two
13 hours; and a post mortem level of 491, which you
14 would translate to an ante mortem moment of death
15 level of what?

16 A. This is one hour and a half
17 you are saying after ---

18 Q. No, the sample was not drawn
19 until autopsy which was some hours after death.

20 A. Yes, but you are presuming ---

21 Q. I am sorry --.

22 A. You say you were presuming ---

23 Q. I am asking you to forget what
24 I said a moment ago please. What ante mortem level
25 would you posit in the blood of this child whose
post mortem blood level was 491?



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A. Again there is a fair amount of variability here. If we take the average of multiplying factors, I would say 2 to 1 ratio would probably be appropriate, so it would be around 240, 250 but it could have been much lower, it could have been 100, it could have been higher.

Q. Let's plump to the middle of the range and look at the 250 then?

A. Okay.

Q. Assuming a level at the moment of death of 250 nanograms, and assuming administration an hour and a half before death, are you able to calculate the dose that would have been required to produce that level?

A. Yes.

Q. What volume or distribution would you use in that calculation, Doctor?

A. Well, as I have pretty good data for an hour after death.

Q. All right.

A. Using a volume of distribution which will be 2 times the volume of the central compartment, so-called, calculated. I also have good data for three hours. Unfortunately I did not bring this immediate data which would have been ---



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Q. We might be able to work it

3

out.

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A. Yes. We should be able to

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get pretty close. If I take the one hour value,

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and this child was about three weeks old, was a

7

little bit on the small side; let's say her volume
of the central compartment was one, okay.

8

Q. Yes.

9

A. At one hour we would double

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it, so we would have two; and her weight was 2.6.

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2.6, so we have 5.2 and I am having a little trouble
with the calculator.

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Q. It doesn't surprise me, I have
a great deal of problem with it.

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250, yes.

A. And we are assuming a level of

Q. Yes.

A. So the minimum amount or the
amount calculated would be 1.3.

Q. 1.3 mg.?

A. Right.

Q. Which is the better part of
3 adult ampoules?

A. Right.

The situation is strange because
no matter I think how you calculate it you will come
up with a very -- with a high value. Even if you
still get times zero --

Q. Yes.

A. -- I think you would come up
with a high value which would be about half of what
we just calculated.

Q. Yes.

A. It would be more than an adult
ampoule.

THE COMMISSIONER: That is the 3 hours?

THE WITNESS: 3 hours? At 3 hours
the multiplying factor would be 5, so it would be $2\frac{1}{2}$
times what we just said. It would be 3.25 mg.



1
DD2 2 MR. LAMEK: Q. Something over 6
3 adult ampoules.

4 Now, doctor, all of these calculations,
5 of course, are on the assumption that the 491 level
6 was a real level recorded in real serum, are they not?

7 A. That is true, yes.

8 Q. And it was that very question
9 that caused you some considerable concern in the
10 summer of 1982, in the spring of 1982?

11 A. Yes.

12 Q. Yes. On August 27, 1982 you
13 attended a meeting at Police Headquarters, Jarvis
14 Street here in Toronto. An extract of the Minute is
15 Exhibit 269, Mr. Commissioner.

16 Now at this stage my interest is
17 in the quantitative use of the fixed tissue levels
18 but I will come back to the 491 level and its reality
19 in a moment.

20 On page 3 of the extract of those
21 Minutes, the bottom of the page, it is indicated:

22 "The Inwood baby was the next one
23 for discussion. This was an 18-day
24 old female buried 15 months. Muscle
25 tissue contained 166 mg. - nanograms
per gram of digoxin. This was a



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little bit elevated but in the normal range.

Dr. Hastreiter said the Inwood baby had a high level in blood or fluid. It was the highest level. He asked when the sample was taken - during autopsy."

That is really the extent of the thing.

What was your concern about that sample at that stage, Dr. Hastreiter?

A. Since I had never seen such a high level before I was really concerned that this was a contaminated sample or something, some fluid that we were not sure of and I was trying to determine exactly where the sample came from.

Q. Okay.

Then you attended a meeting on September 13th, and the question of the sample yielding the 491 level was a matter of some concern there.

Pages 4 to 6, please, half-way down the page on page 4.

THE COMMISSIONER: Sorry. What exhibit?

MR. LAMEK: Exhibit 261, sir. I'm



DD4

1
2 sorry. Minutes of September 13th.

3 Q. Perhaps we can go quickly
4 through the whole of the note of this discussion,
5 doctor.

6 You reported first on the medical
7 history and treatment, gave a bit of the history of
8 the child, and reported that based on clinical
9 findings you put this death in the good category.

10 That I take it is the good probability
11 of massive digoxin overdose?

12 A. Right.

13 Q. Dr. Fay rather disagreed and
14 in his review of the charts he thought it was a low
15 suspicious death; couldn't rule out the possibility
16 of digoxin overdose but he didn't get very warm
17 about it.

18 Mr. Cimbura reported on the toxi-
19 cological information and reported on the values in
20 the myocardium, fixed myocardium.

21 On the next page there was then
22 discussion about the blood or serum sample, questioning
23 whether the one Cimbura had was a true specimen. If
24 it were, then he would have to say it was poisoning.

25 There was discussion about the
origin of the serum.



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Sgt. Warr advised it was stored as a specimen. He said the blood had been heated and then apparently frozen.

And the next bit is attributed to you but I suggest wrongly. I think it is rather Mr. Cimbura.

A. Right.

Q. He said he heated the serum which contained a normal amount of digoxin and it hadn't had any effect on the assay.

Now in very short compass there there is summarized a discussion of the reliability of the 491 level reflecting the integrity, if you will, of this sample. Is that fair, Dr. Hastreiter?

A. That is correct.

Q. Was that a matter of some anxious discussion at the meeting?

A. I would say so, yes.

Q. Lower down that page you are reported as saying you agree with Dr. Fay that the child was very sick and indeed you could argue very strongly that the death had been natural except that the death had occurred unexpectedly, and everything hinged on the toxicological findings, and we don't know what this specimen is, referring there I take it



DD6

1
2 the 491 nanogram specimen.

3 That was the one that was concerning
4 you, doctor?

5 A. Yes.

6 Q. Right.

7 And he said that if he were a
8 defence lawyer he would say this might have been
9 contaminated.

10 Well, he may well be on the way to
11 anew career.

12 On the other hand the fixed myo-
13 cardium specimen had a high level, digoxin level,
14 and the skeletal muscle is high and then there is
15 what is called a vote, you voted suspicious death.

16 A. I should perhaps clarify this.

17 It wasn't really a vote. It was a
18 matter of exchanging of opinions so everybody would
19 give his or her opinion.

20 Q. Right.

21 A. So that a conclusion could be
22 drawn by the -- the Coroner had the final word.

23 Q. You expressed the opinion then
24 that this was a suspicious death and you were not
25 placing much weight on the toxicology analysis because
you didn't know where the serum came from?



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Q. That was still causing you difficulty at the time this opinion was expressed. Nonetheless I am interested in your opinion, doctor.

You had said on the basis of the clinical record alone without any reference to toxicological information that Inwood was a good probability of massive digoxin overdose.

Did this opinion of suspicious death downgrade that a little?

A. No, not really because the clinical classification is different from this final grouping.

Q. Yes.

A. You see the clinical classification was as I stated purely based on clinical findings.

Q. Yes.

A. Then we would get the toxicological information and arrive at a final diagnosis.

If the child had a good category for the clinical findings but had no toxicological evidence we would usually move the child down into a suspicious category but not a good -- good ones were usually a sign only of those who had toxicologic confirmation or some good evidence.



DD8

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2 Q. Inwood was not a child without
3 any toxicological information even if you had doubts
4 about the serum sample. There was still the very high
5 fixed myocardium level.

6 A. Oh, very frankly I was also
7 concerned with the fixed myocardial specimens. I
8 didn't want to put too much emphasis on them.

9 At the time I had perhaps a little
10 less information that I have now regarding these
11 specimens because Mr. Cimbura had performed some
12 studies later to show what happens with the Klotz
13 solution.

14 Q. Yes.

15 A. And these findings were not
16 available then.

17 Q. Okay. So you are leery of the
18 toxicological information. You didn't know where
19 the serum sample had come from or what it had been
20 through and you were rather cautious about putting any
21 emphasis upon the levels in fixed tissue?

22 A. Exactly.

23 Q. At that time.

24 A. Yes.

25 Q. You therefore regarded this
death when your opinion was canvassed as a suspicious



DD9

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2 one. And then of course a discussion followed.

3 It is set out on page 6, and that
4 discussion culminates in a further canvassing of
5 opinion, and now you express the opinion this is
6 probable murder, as indeed does everybody else present.

7 Now I agree that Dr. Fay didn't
8 make as large a move as you did - I mean he made
9 a larger move than you did from low suspicion to
10 probable murder, but nevertheless what was it, Dr.
11 Hastreiter, that resolved your concerns about the
12 toxicological data in the space of that discussion
13 so as to enable you to change your opinion from one
14 of suspicious death to probable murder?

15 A. That would be on page 6, right,
16 the final -- the second conclusion we arrived at.

17 Q. Yes.

18 A. There was considerable more
19 discussion following our first diagnosis or categoriza-
20 tion, and as I mentioned before Mr. Cimbura is a very
21 cautious person really and he is very conservative,
22 but I believe that in the course of the subsequent
23 discussion we became convinced that specimens were --
24 that the blood specimen was valid, it was not
25 contaminated, and also I think perhaps -- I am not
one hundred per cent sure whether this contributed,



DD10

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2 but I think that Mr. Cimbura indicated that this
3 was the highest fixed myocardial level that we had
4 had and he felt it was highly significant.

5 I think it was on this toxicological --
6 on the basis of toxicological evidence that we
7 changed our vote.

8 If we had confidence in the source
9 of the specimen and in the meaning of this high
10 level in the fixed specimen to begin with we would have
11 placed this baby immediately in a probable murder
12 category.

13 I think the problem was our confi-
14 dence in the source of the blood specimen, and also
15 perhaps not enough knowledge about value of the
16 fixed specimen.

17 Q. Yes. Well, doctor, I can
18 understand that Mr. Cimbura may well have influenced
19 you to place some weight upon the fixed tissue
20 samples by his comment as to this being the highest
21 level measured, but I confess I am at something of
22 a loss to know how in the course of that debate you
23 could have acquired any greater confidence in the
24 integrity of the serum sample. You still had no more
25 information as to where it had come from, did you?

A. I believe that I did. I



DD11

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2 believe -- you see there were so many factors
3 involved. First we talked about the source of the
4 specimen. It was I believe found in a virology
5 laboratory --

6 Q. Did you know that then?

7 A. I think we found out -- I found
8 out on this particular day about it.

9 Q. It came as a considerable
10 surprise to us, a matter of two or three months ago
11 to find that, and I think to the Hospital too.

12 A. No, I had the impression that
13 we knew about it then.

14 Okay. The source of the specimen,
15 the fact that it had been -- it had been frozen I
16 think for a while and then it was heated. It
17 suffered a lot of physical changes, and I think we were
18 all very concerned.
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EE/BM/ak

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3 Mr. Cimbura was the key person for
4 this particular case because the toxicological
5 evidence was very critical and I think it was he
6 who eventually sort of convinced us that the quality
7 of these analyses were such that we could rely on
8 them. That was basically it.

9 Q. Okay. Well, in one way or
10 another you, and presumably the others present at
11 the meeting, were satisfied that you could place
12 some reliance upon the toxicologic information. I
13 notice that you, Dr. Hastreiter, even in now express-
14 ing an opinion of probable murder, put a caveat on
15 that and you report it as saying:

16 "The digoxin level is very high unless
17 this sample is a total disaster."

18 In other words, still reserving the
19 right to back off if it were discovered that there
20 was something horrid about that sample.

21 A. I think there is a little
22 editorial editing.

23 Q. There may be. Although those
24 are the words you used, interestingly, at the
25 preliminary inquiry.

A. Really.



EE2

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3 Q. Yes. Well, we now know some-
4 thing about this, and perhaps you knew a little over
5 a year ago, Doctor, we know more than we did when
6 we started out. We know that the sample likely was
7 serum, that it was from the Virology Department, that
8 it had been stored or refrigerated there for some
9 time and it had been thought at one time this may be
10 whole blood or something of that sort. We know that
11 the sample was drawn by Dr. Taylor at autopsy and
12 although he has no recollection of this particular
13 item he has said here that his normal practice at
14 autopsy was to draw blood from the inferior vena cava.
15 So, there is at least some suggestion that that might
16 have been at source.

17 We know of course about Mr. Cimbura's
18 research that he described at the meeting. On the
19 basis of all that you now know about the Inwood case,
20 Dr. Hastreiter, what is your opinion today of the
21 likelihood that digoxin toxicity caused that child's
22 death?

23 A. I think it is very high. You
24 see, if there was no question about the source of
25 the specimens and the interpretation of the fixed
specimens, I think this would have been placed in the
murder category because we had enough clinical and



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toxicological evidence to do that. However, it is because of this uncertainty, I think relatively small uncertainty which still remained, that she was placed in the category of probable, probably murder.

Q. Okay.

A. But I would say the index of suspicion is extremely high.

Q. Thank you.

Moving on to Jordan Hines,
Mr. Commissioner, how is my timing this time?

THE COMMISSIONER: Excellent. We
will take 15 minutes.
---Short recess.



EE-2
BM/PS

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2 ---Upon commencing after the break.

3 THE COMMISSIONER: Yes, Mr. Lamek.

4 MR.LAMEK: Mr. Commissioner, just
5 before I ask Dr. Hastreiter another question I have
6 good news for you. There is an index of the
7 Hastreiter binder.

8 THE COMMISSIONER: Thank you.

9 MR. LAMEK: Q. Dr. Hastreiter, just
10 about the time we broke for the recess I promised
11 you that I was now going to turn my back on Inwood
12 and go on to Hines. You will probably recognize
13 by now that I lied. Let us go back to Inwood for
14 a moment, please.

15 Frankly, I am still concerned about
16 the change of views that occurred following the first
17 expression of opinion at the meeting of September
18 13 leading to a second expression of a rather more
19 stern opinion and a consensus that the Inwood case
20 was one of probable murder. Do you have those
21 minutes available to you?

22 A. Yes.

23 Q. On Page 6 there is summarized
24 the discussion following the first statement of
25 opinion. Towards the end of the first full paragraph,
or half way through the first full paragraph:



1
2 "Dr. Hastreiter stated that from a
3 purely medical standpoint the myo-
4 cardium level is high, skeletal
5 muscle is high, serum is extremely
6 high, almost unbelievable which makes
7 it suspicious. That is why he had
8 originally placed this child under the
9 probable category. Dr. Hastreiter
10 said that if this information is ac-
11 ceptable he would say probable, but
12 from the way Mr. Cimbura feels about
13 it, he did not think this toxicology
14 evidence would hold."

15 May I take it that at least to that
16 point in the discussion you had not been persuaded
17 of the reliability of the toxicological evidence?

18 A. That is correct.

19 Q. All right.

20 A. Maybe I should point out that
21 the way the minutes are written may not always
22 reflect exactly what went on chronologically.

23 Q. No, I appreciate that. But
24 the only statement that I see in that discussion
25 which was attributed to Mr. Cimbura is at the
beginning of the third paragraph:



1
2 "Mr. Cimbura stated from a scientific
3 point of view it is an unusual finding.
4 200 was about the highest for serum.
5 From the point of view of a scientist,
6 is very uneasy."

7 And if that be anything like an accurate summary of
8 what Mr. Cimbura said, and I will ask you about that,
9 but if it be accurate it hardly bespeaks great
10 confidence by Mr. Cimbura in the reliability of the
11 491 level, does it, Doctor?

12 A. All I can say is that Mr.
13 Cimbura, although this may sound bad here, it is
14 much better than it had been earlier because he
15 at least had confidence. You see, the whole problem
16 here revolves around the reliability or not of
17 this toxicological evidence.

18 Q. That's right.

19 A. And he is a very conservative
20 person and even here he sounds like he's not totally
21 confident in his analysis perhaps. I was very
22 doubtful in the beginning, especially because of the
23 source of this blood specimen, and because perhaps
24 I wasn't quite aware of the magnitude of the levels
25 in the fixed myocardial specimen before, but of
course I was aware of them before the first vote, so-



called.

Q. Yes.

A. But the only change that occurred and that was that we became more cognizant of the fact that the specimens could be relied upon to the degree that we could classify this child as probable murder. I think this would have happened earlier had we had confidence in the specimens. This problem was to some degree clarified, at least to the extent that we were persuaded to change the category. We did not call her a murder, although toxicologically we had practically enough evidence to do so if we knew the source of the specimens we could rely on.

Q. Well, in any event, for one reason or another the views were changed in the course of the discussion and the second set of opinions were expressed as stated on the foot of Page 6, I take it.

A. Correct.

Q. Okay, then, Doctor, let's go on to Jordan Hines.

THE COMMISSIONER: This index. September 30th, 1981, is that correct?

MR. LAMEK: Yes.

THE COMMISSIONER: Because you were saying earlier I thought that you were making reference



1
2 to information that would have come out at the
3 preliminary inquiry as being available. Was the
4 update September of 1981?

5 MR. LAMEK: No, Mr. Commissioner. As
6 I understood Dr. Hastreiter's evidence, that portion
7 of the binder which runs from Page 10, the covering
8 letter.

9 THE COMMISSIONER: Yes, so all May
10 29th?

11 MR. LAMEK: To Page 33.

12 THE COMMISSIONER: Yes.

13 MR. LAMEK: Is on May 29th.

14 THE COMMISSIONER: Yes.

15 MR. LAMEK: Page 1 to 9 are September
16 30, 1981 and everything after Page 29 is the summer
17 of '82, as I understand it.

18 THE COMMISSIONER: Yes, all right.

19 THE WITNESS: But it is repeated
20 three times.

21 MR. LAMEK: It is repeated three
22 times.

23 A. Yes. It cannot be eliminated.

24 Q. Well, Mr. Scott at a very early
25 stage in this inquiry said to a medical witness,
"You will learn, Doctor, that lawyers need to have



1
2 everything said to them three times before it sinks
3 in," and that may be the reason that we have done
4 it this way.

5 THE COMMISSIONER: Well, can I just
6 object a little bit to this because you asked
7 Dr. Hastreiter several questions about what took
8 place in the preliminary inquiry and then you said
9 why did you not have that in your update. That
10 was, questions relating to certain of the -- I
11 guess it was Inwood.

12 MR. LAMEK: Yes, it was Inwood.

13 THE COMMISSIONER: Why did you not
14 have it in your update.

15 MR. LAMEK: Yes.

16 THE COMMISSIONER: He had it in his
17 preliminary inquiry, if he had it in the preliminary
18 inquiry, why did he not have it in the update
19 and you fooled me into thinking that the update
20 came after the preliminary inquiry.

21 MR. LAMEK: No, the second review
22 came after the preliminary inquiry.

23 THE COMMISSIONER: Yes, and what you
24 really meant was why did you not have it in your
25 second review, is that what you are saying?

MR. LAMEK: If I used the word up-date,



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2 I apologize for that. I hope Dr. Hastreiter wasn't
3 misled by the use of the word.

4 THE WITNESS: No.

5 THE COMMISSIONER: Well, I was misled
6 and I am quite sure that I am the only person in the
7 room who was and I'm not any more.

8 The second review, all right, okay,
9 thank you.

10 MR. LAMEK: Thank you, sir.

11 Q. Jordan Hines, Dr. Hastreiter,
12 you will recall, like Kevin Pacsai, had an anatomically
13 normal heart and also digoxin was never prescribed
14 for this child. You scored him three for severity of
15 his cardiac problem and on your assessment of the
16 clinical picture found on Page 18 of the binder you
17 reported that the death was quite unexpected and that
18 the possibility of digoxin toxicity must be entertained
19 strongly. There is a very brief summary of the case
20 on Page 18 in your initial report, but nevertheless
21 one about which you have begun to entertain a
22 rather firm suspicion, I take it.

23 A. Yes.

24 Q. By the late summer of 1981
25 toxicological information had become available in-
dicating the presence of digoxin in the child's fixed



1
2 heart tissues and in your update of September 30,
3 1981 you deliver an updated report on Baby Hines.
4 That is found at Page 8. It is now a little more
5 full summary of the baby's course and history and
6 refers to the autopsy findings, including those
7 findings which were suggestive of a missed SIDS
8 incident.

9 The final paragraph:

10 "Biochemical analysis of the fixed
11 heart specimen revealed the presence
12 of digoxin in the left atrium, right
13 atrium, left ventricle, right
14 ventricle, ventricular septum and
15 papillary muscle. There was also a
16 measurable concentration of digoxin
17 in the Klotz solution bathing the
18 heart. This finding appears to be
19 very significant, especially since no
20 digoxin had been ordered for Baby Hines
21 by the physicians. It would be
22 important to have this chemical finding
23 confirmed by another method, if at all
24 possible."

25 Now, accepting the significance which you attach
to the finding, can you tell me what you had in



1
2 mind by the suggestion that the chemical finding be
3 confirmed by another method, if at all possible?

4 A. There had been some discussion
5 about making sure that we eliminate any cross-
6 reactivity or substances which may interfere with
7 the assay. So, we talked about using, in addition
8 to the RIA, to use the HPLC.

9 Q. I see.

10 A. Possibly mass spectrometry.

11 Q. On the basis of the report of
12 digoxin in the fixed tissues of this child, did you
13 conclude that the child had received one or more
14 unprescribed doses of digoxin?

15 A. Yes.

16 Q. And I take it no other
17 explanation for the presence of digoxin in the tissues
18 occurred to you?

19 Not even that limited
20 conclusion, that is to say that digoxin had been
21 administered to this child, serve to feed the
22 suspicion that you had entertained on the basis of
23 the clinical picture.

24 A. Yes.

25 Q. Yes. In the second last
paragraph on Page 8, as I have said, you referred to



10 1
2 those autopsy findings which were suggestive of an
3 earlier incident of missed SIDS, but you appear to
4 reject Sudden Infant Death Syndrome as the cause of
5 this child's death on the ground that SIDS would not
6 explain the child's terminal arrhythmias. Are you
7 still of that view, Dr. Hastreiter?

8 A. Not necessarily terminal
9 arrhythmias, but arrhythmias in general. The child's
10 problem appeared to be one of arrhythmias. This is
11 why he had been admitted to the hospital and, in my
12 opinion, SIDS is a diagnosis of exclusion where you
13 have to exclude other causes that might be responsible
14 for a child's problem which may or may not be
15 death, near death or actual death and although
16 arrhythmias have been reported in association with
17 SIDS, certainly as a terminal event as a rule, or
18 it is not common to have arrhythmias and SIDS
19 together, it would be, I would say, a coincidence to
20 have two diagnoses instead of -- you know, you try
21 to limit the number of your diagnoses to one that
22 can explain everything, if possible.

23 So, I feel that SIDS is a diagnosis
24 of exclusion, since there were other reasons here
25 for the child's problem, namely, the arrhythmia
SIDS I don't think can be used for a diagnosis.



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Hastreiter, dr. ex.
(Lamek)

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Now, the pathological findings, the
enforced diagnosis of SIDS perhaps, they support it
but again, only if you can exclude everything else,
which is not the case here.



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3 I think we have here a situation of a baby who had
4 bradycardia, tachycardia syndrome; he was not
5 expected to die or to deteriorate. In fact, the
6 baby was in the Hospital and was being fairly closely
7 monitored and then suddenly deteriorated.

8 I think it is important to say that
9 the baby was in the Hospital and was being observed.
10 If this had happened at home one would never know,
11 one could perhaps call it SIDS because one would not
12 have the knowledge of the problem if the baby had
13 just suddenly died at home, but that was not the
14 case.

15 Q. Dr. Hastreiter, is it your
16 recollection from reviewing the chart this child was
17 on both a cardiac monitor and an apnea monitor?

18 A. I don't remember that, I don't
19 remember.

20 Q. I believe that to have been
21 the case. If that be so, does that not suggest that
22 the child was considered to be at some risk of
23 rapidly deteriorating?

24 A. Yes, and this is also the
25 way that babies - candidates for SIDS are monitored.
But again I - here a child who is being monitored
who deteriorates suddenly; who was not supposed to



FF2

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3 receive digitalis, and is found to have digitalis
4 in the tissues, I think, you know, I'm not sure we
5 have enough evidence to really say that with total
6 certainly that digitalis killed this baby, but we do
7 have a lot of factors here which makes it a strong
8 probability.

9 Q. Before you knew about the
10 finding of digoxin in the tissues of this child of
11 course, you had formed an opinion on the basis of
12 the clinical picture, that although it was a pretty
13 good likelihood, a pretty good possibility that
14 digoxin had played a part in his death.

15 A. Yes.

16 Q. Notwithstanding that the
17 child was connected to apnea and cardiac monitors,
18 which we agreed is suggestion of an apprehension that
19 he may indeed suddenly decline.

20 A. Yes, but it is also a way of
21 diagnostic procedure to follow a child with sick
22 sinus syndrome, you want to see what the variability,
23 what type of arrhythmia develops. Now, the
24 respiratory monitoring is a little different, and
25 in some places it is just done automatically, the
two together, cardiac EKG and respiratory, and in
other places it is not, so I am not sure exactly what



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2 the reason was in this situation.

3 Q. Dr. Hastreiter, I recognize
4 what you say about the desirability of finding - of
5 arriving at a single diagnosis that will explain all
6 facets of the child's condition and the circumstances,
7 but I take it it is not necessary to do that, is it?
8 Why is it - is it necessary that SIDS explain the
9 arrhythmias that this child had experienced?

10 A. My feeling is if you have a
11 child - let us say you have a young baby who has
12 known arrhythmias, and the child is being worked up
13 for arrhythmias, sometimes treated for the arrhythmia
14 and then eventually dies of the arrhythmia, I don't
15 think you can call that a case of SIDS, okay.
16 Because SIDS is a Sudden Infant Death Syndrome of
17 unknown origin at this point, to my knowledge,
18 unexpected. Now, this child was known to have
19 arrhythmias, was being monitored, developed a terminal
20 arrhythmia. Now this of course is a question mark
21 whether this terminal arrhythmia was part of his
22 own original disease, or was it part of the digitalis
23 intoxication which I think is a good probability.
24 Could even be part of SIDS, because SIDS could die of
25 terminal arrhythmia but not usually with arrhythmias
preceding the cause of the illness, that is what makes



Hastreiter, dr.ex.
(Lamek)

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2 it very unusual.

3 Q. I think I have followed you
4 to that point now. When you gave evidence at the
5 preliminary inquiry, and that evidence is found in
6 Volume 34 beginning at page 11, you recall that it
7 was consistent with the opinion that you had
8 expressed in your May and September 1981 reports,
9 that clinically there didn't seem to be a very
10 satisfactory explanation for the arrest and death,
11 and the digoxin involvement made it entirely impossible
12 that this child had died as a result of intoxication.

13 When you reviewed the death again in
14 the summer of 1982, and that is found at page 158 of
15 the binder, you produced the same observations,
16 opinions and conclusions that you made and reached
17 the year before.

18 Just to complete the pattern of
19 consistency in this one, Dr. Hastreiter, the meeting
20 at the Hospital on September the 13th, 1982, which
21 is pages 2-4 of Exhibit 261 you said that you:

22 "...regarded this case as a good

23 prospect of digoxin overdose..."

24 And when the time came to express a final opinion on
25 it your opinion was that this was a case of "probable
murder". Are you still of that same opinion today,
Doctor?



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A. Yes. I think a very significant factor here, is again the fact that Baby Hines was not prescribed digoxin and digitalis was found in his body.

Q. Now I take it here though, Doctor, with only digoxin concentration in fixed tissues and subsequently in exhumed tissues, but with no blood levels, it is impossible to estimate a dose or a time of administration or anything of that sort is it?

A. That is true. However, again here we are dealing with - I like to be very careful about fixed specimens and I really am.

Q. Yes.

A. I don't like to rely too much on those specimens, but this is all we have here. We have levels in the left ventricle and the ventricular septum which are higher than 100, and this is again a heart that had been fixed for three months prior to the analysis. These are high levels I think - you know, this enforces my standing regarding "probable murder".

Q. What you have just said fits very nicely to the next two children that I want to talk about, two other children whom digoxin



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was not prescribed and includes tissues, exhumed tissues, and in these cases digoxin was found, that is to say Stephanie Lombardo and Jesse Belanger.

First, with respect to Lombardo, it appears to me that this was not a death which you reviewed or reported on in 1981, is that consistent with your recollection?

A. This is true.

Q. And the child was exhumed during the course of the preliminary inquiry?

A. Right.

Q. And Mr. Cimbura's laboratory performed digoxin assays on tissues from an exhumed body, and the results are reported in Exhibit 95C at pages 2 to 3 of that report.

The results are reported consistently as digoxin, and Mr. Cimbura's way of indicating they are recorded by RIA/HPLC and then a further RIA and show levels ranging from 280 nanograms per gram in a piece of tissue labelled muscle; to 667 nanograms per gram in heart septum; 487 nanograms in left ventricle; 354 nanograms in liver; 289 nanograms in lung; and 225 nanograms per millilitre in a brownish red fluid identified only as chest fluid, and no further identification possibly in that regard.



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Now, you gave evidence at the preliminary inquiry, Dr. Hastreiter, as to the significance of those findings, and that evidence is found in Volume 34 at page 16; I won't take the time to read that but I hope I summarize it correctly. It was your view that if the chest fluid in which concentration of 225 nanograms per mililitre was measured, if the chest fluid were blood it would certainly indicate in your mind digoxin poisoning. You didn't know what that fluid really was and it could be contaminated by stomach contents you said, you didn't know what it could be?

A. Right.

Q. You then referred to the recorded tissue concentrations which clearly was also very high and which at that had they been measured in fresh tissue would be strongly suggestive of poisoning.

On the other hand, you recognized in your evidence that dehydration or dessication of the tissues may have served to elevate the digoxin concentrations, but you were still inclined to regard the digoxin levels in the exhumed tissues as pointing to the probability that the child had received an overdose of digoxin, but you couldn't, you said,



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arrive at that conclusion with any absolute certainty?

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A. Correct.

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Q. Have I reasonably summarized
what you recall your evidence to have been?

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A. Right.

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Q. Are you still of those same
viewswith respect to the toxicological data in the
case of Stephanie Lombardo?

9

A. Yes. I had some reservations
about the source, the quality of that fluid.

10

11

Q. Yes.

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A. And what it was, whether it
was contaminated or not. I was concerned about our
lack of experience with exhumed tissues, and the
fact that possibly dehydration or drying of the
tissues could have concentrated digoxin and made it
appear higher than it actually was. However, it
would be very, very difficult to explain, even if
his levels were within a therapeutic range, you know,
why would they be there and this child was not pre-
scribed digoxin. Not only that, but if the child had
accidentally received one dose of digoxin you would
not expect to have even therapeutic levels in the
tissues, and certainly not in fluid if it were blood,
and of course we don't know exactly about that.

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This was the source of my reservation, otherwise there would be very little doubt that there would be "probable murder".

Q. But I take it the one clear thing about the findings of digoxin by HPLC and RIA in the tissues of this child is that digoxin was found at all, that is the truly significant thing about the findings is it not?

A. I think more than that, perhaps the fact that these levels are really quite high, you know. I think all levels are considerably above what one would consider normal therapeutic range in these tissues. Of course, as I say, we don't have a lot of experience with exhumed bodies and it is difficult to interpret these values.

Q. Is there any question in your mind, however, Dr. Hastreiter, but that this child received one or more ^{un}prescribed doses of digoxin?

A. No question at all.

Q. And you have to some extent on the basis of the levels recorded here, I suggest you have expressed a very qualified opinion on the quantitative significance of those findings, have you not?

A. Yes.



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Q. Not within any range of precision but you have said they are very high. They are higher than you would expect to find in the case of one mistaken dose having been delivered to the child?

A. Definitely.

Q. And I take it they give you cause for concern as to the likelihood of digoxin having been involved in this child's death?

A. Yes.

Q. Now Exhibit 261 which is the Minutes of the meeting of September 13th, at page 7 --

MR. SCOTT: If I might suggest, it is a cross-examination question, but we might with Mr. Lamek's consent have it now. In the light of the answer to Mr. Lamek's last question would he care to ask the doctor what he would have expected to find?

THE COMMISSIONER: Sorry, when?

MR. SCOTT: He has elicited that this is not what the doctor would have expected to find. Perhaps he might care to ask him what he would have expected to find.

MR. LAMEK: There is no problem with that.

MR. SCOTT: I think he can't tell us



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2 that. That may be the difficulty.

3 MR. LAMEK: Q. You have said, Dr.
4 Hastreiter, that the levels recorded in these
5 exhumed tissues were greater than you would expect
6 to see had this child received by error the normal
7 maintenance dose - I assume maintenance dose of
8 digoxin. Was that your meaning?

9 A. Right.

10 Q. Now that rather implies as my
11 learned friend Mr. Scott says that you might have had
12 some expectation as to the levels you would find had
13 the child received a normal maintenance dose in error.
14 Can you give us an idea what you might have expected
15 to find had the child received a normal maintenance
16 dose by error?

17 A. I think first of all one should
18 understand that the ordinary child that is treated
19 with digoxin is not treated with one maintenance dose.
20 The child is usually loaded with the medication first,
21 so-called digitalization, and then maintained on the
22 drug.

23 If you were to give a child let's
24 say you take any baby and give the baby one maintenance
25 dose of the drug without any previous loading, your
blood level would be very low; your tissue levels



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2 would be extremely low, and there is no way that you
3 would expect even if you had severe dehydration or
4 crying of these tissues to have such a high concentra-
5 tion in the tissue. So I can't tell you the exact
6 figures.

7 I would expect if this was a fresh
8 body, fresh specimen I could tell you, but being
9 exhumed and being possibly dry, dehydrated, I just
simply don't know.

10 I know that the magnitude is such
11 that I have very little doubt about the fact that this
12 was not a maintenance dose.

13 Q. Doctor, could we come at it
14 perhaps another way. If these levels had been
15 recorded in fresh tissue would they have been
16 consistent with the concentrations that you would
17 expect to see in a child who had been receiving
18 digoxin on a regular ongoing way as part of a regime
of therapeutic administration?

19 A. No. They are much higher.

20 Q. They would have been higher
21 even than that?

22 A. These levels are much higher
23 than they would have been in fresh tissue in a child
24 who had been receiving a therapeutic regime of the
25



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2 drug, yes.

3 Q. Mr. Cimbura has indicated to
4 us in the context of his report on Cook -- in the
5 context of his report on Cook as indicated to us the
6 range of findings in fresh tissue.

7 You said on page 4 of 95A "The range
8 of values found in heart muscle in persons on
9 digoxin therapy, as reported in the literature and
his own research, is anywhere from 49 to 975 nanograms."

10 A. Well, that again I think is a
11 little bit conservative and exaggerated. There is
12 one report of 975 nanograms.

13 Q. Yes.

14 A. But I think this was a small
15 series of cases in which the concentrations were
16 considerably higher than anybody else's, and I myself --
17 we have analyzed a very substantial number of cases,
18 and I think our series is usually quoted, and we have
19 never had levels of this magnitude so I don't believe
that. I think it is an error.

20 Q. Which range do you expect to
21 see in the heart tissue in an infant who has been on
digoxin therapy?

22 A. The highest level --

23 Q. I am interested in the lowest
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level.

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A. Oh, lowest level?

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Q. Yes.

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A. The lowest level can be anything
depending on the dose. It could be --

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Q. Standard maintenance dose --

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A. A regular --

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Q. Regular.

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A. Regular maintenance dose?

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Q. Yes.

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A. Okay. Let me look it up for

12

you.

13

MR. SCOTT: The question I take it
has to do with a baby who is on therapy?

14

MR. LAMEK: Yes.

15

THE WITNESS: Yes.

16

Q. I am talking about therapeutic

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concentration.

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A. We just published a new paper

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where we have actually listed all the levels in

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general forensic sciences which --

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Q. That is Exhibit 276?

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A. No, I don't think it is --

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Q. Not the Journal of Forensic
Sciences?

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A. It should be out this month.

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I haven't seen it really but you can find all the levels. They are the actual levels, and what I can give you here are the ranges, you know, approximately.

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This would be a child on chronic maintenance under two years. So, for instance, the left ventricle level would range from - I don't have the lower level here unfortunately. I have to more or less use the standard deviation and it can be very low, the lowest level, probably around 15 or 20 or something like this, and it can go up to 450, but that is unusual.

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The average, in the usual situation that you would see in a baby this age on therapeutic dose would be anywhere from around 80 to 300 or something like that.

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Q. Okay. And coming then to what may be a sort of answer to Mr. Scott's question, do I take it when you say the levels here are greater than you would expect to see in a child who had received a single dose by accident, you would expect in a child with a single dose by accident levels lower than the ranges normally manifested by children on continuing therapy?

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A. Oh, much lower.



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Q. Okay.

A. Especially if it is only a maintenance dose. If it is a loading dose --

Q. If it is a loading dose?

A. Then it would be reaching the level of -- actually we try to divide our cases into acute and chronic. The ones on chronic maintenance usually will tend to have a little higher levels than the therapeutic digitalized ones.

Q. I was asking you about the meeting of September 13th.

At page 7 in the context of discussion on Stéphanie Lombardo Mr. Cimbura, two-thirds of the way down the page is quoted as saying:

"...the mere finding of digoxin is significant because this child was not on digoxin therapy. However, purely from a toxicology point of view, Mr. Cimbura said these findings were inconclusive."

When it came to the vote, Dr. Hastreiter is reported as having expressed his view that this was probable murder but it is his comment that interests me:

"Child was doing reasonably well after surgery; was not supposed to



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be receiving digoxin, and high digoxin levels were found in all tissues. If the child received a maintenance dose accidentally, there would not be these levels."

Which is just what you said to us.

But that statement was made presumably in the presence of Mr. Cimbura.

Did Mr. Cimbura challenge that statement when you made it? It was he who had said these levels were inconclusive.

A. No, he didn't challenge my statement. I don't think he committed himself any further except that his vote was also for probable murder.

Q. Yes.

A. That indicates that he would agree probably with my conclusions.

MR. LAMEK: Belanger time, Mr. Commissioner. May we do that in the morning, please?

THE COMMISSIONER: Yes. All right.

Ten o'clock.

--- whereupon the hearing was adjourned at 4:30 p.m until Wednesday, the 7th day of December 1983.

